APRIL, 1956

INDUSTRY & WELDING

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WJR

A Natural for Structural Welding . . . page 66

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Medium-class holder, model A-W, 14 ounces, lightest holder made to take 1/4" rods, rated 300 amps, with its long lever, and fitting the hand like a glove, is the most popular in the Jackson line.

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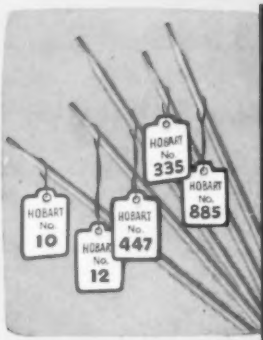

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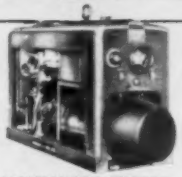

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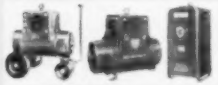

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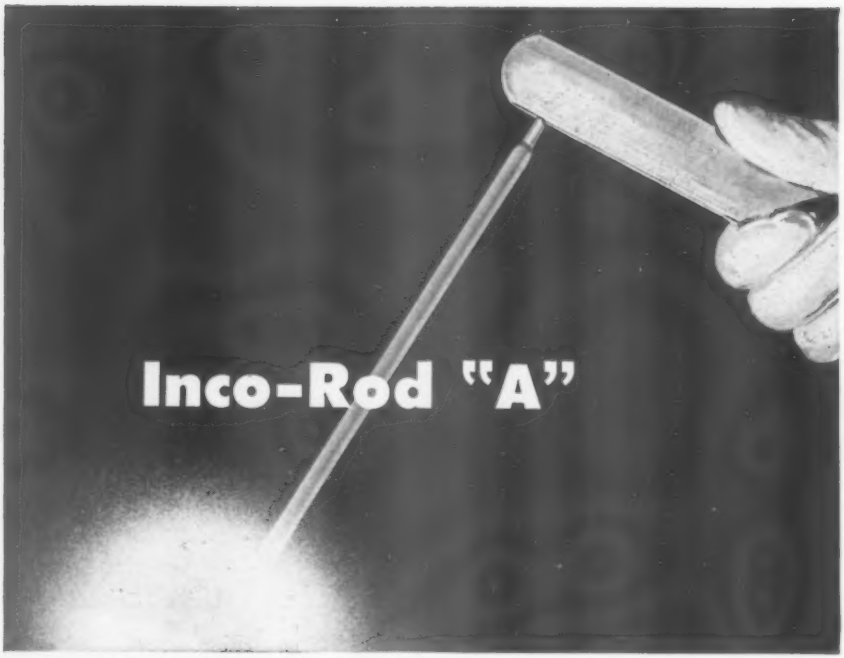

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Industry & Welding

APRIL, 1956

VOL. 29 No. 4

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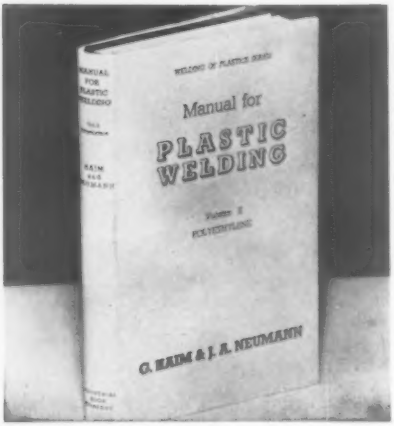

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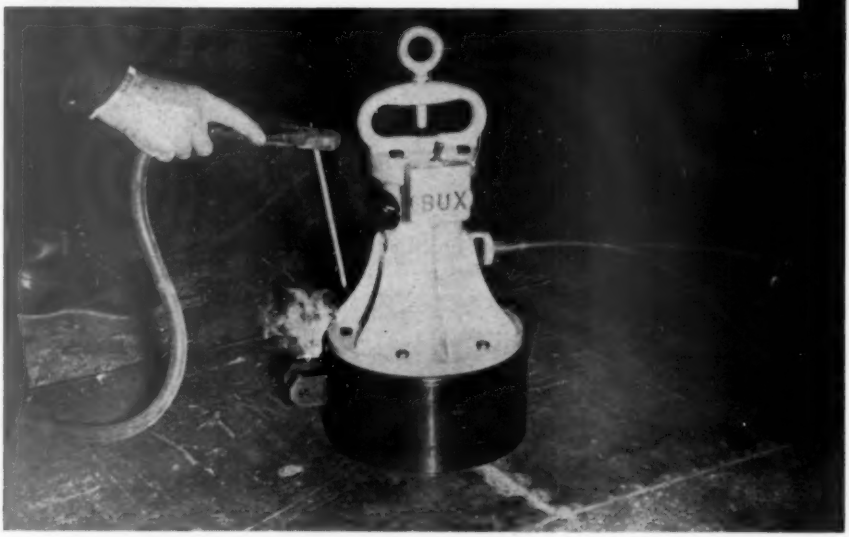

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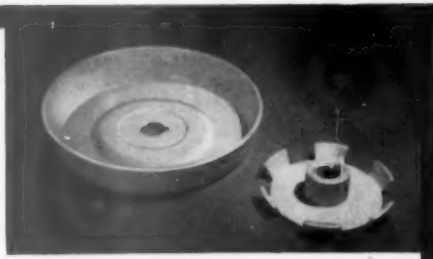

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LETTERS TO THE EDITOR

More Data On Resistance Welding

Gentlemen:

I have read with interest an article entitled "How and Where to Use Seam Welding", which appeared in the September 1955 issue of your publication.

The editorial note at the beginning of the article stated "This is the fourth part of an 'ABC' series, giving comprehensive practical information on each of the basic resistance welding methods."

I would like very much to have the complete series. If reprints are available, kindly send them to me at the above address. In the event that reprints are not available please advise me how I can obtain the series, and also of any costs which are involved.

Donald Q. Cole, Research Engr.
North American Aviation, Inc.

The complete series has been sent to Mr. Cole with our compliments.

Some More About "The Future for Welding"

Sir:

I had hoped to see you at the Metal Show at Philadelphia to congratulate you personally on your October Issue which is in my opinion the best issue you have ever had and one of the best issues of any publication I have ever seen in the welding field.

It is so good I would like to have five extra copies—if they are avail-

(Turn to Page 12)

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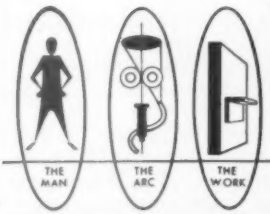

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(Continued from Page 10)

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Gentlemen:

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Thank you for your cooperation.
Evelyn M. Chambers
Micro Switch Division,
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This apparently was one of our most popular editorial features on resistance welding. We have received many such requests and have gladly made the material available.

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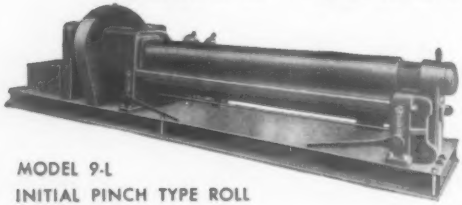

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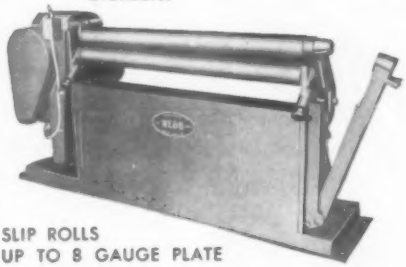

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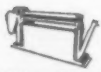

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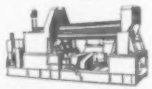

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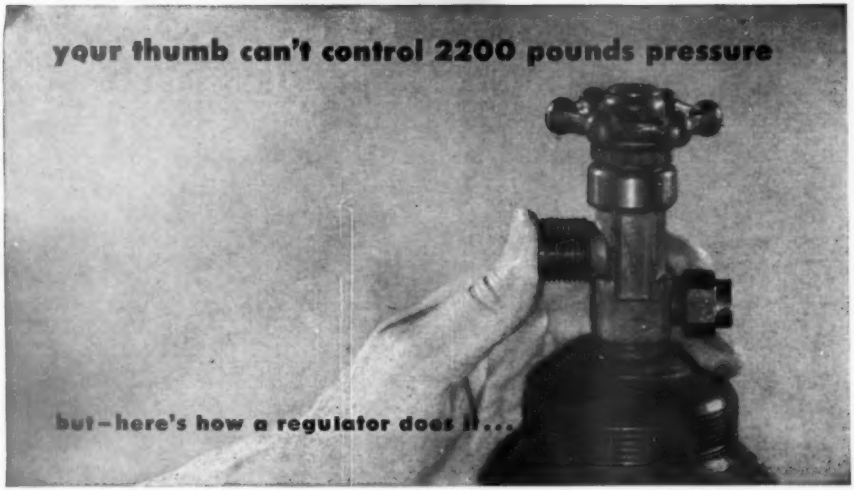

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Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

55 **Welding of dissimliar metal joints** with new, versatile electrode is explained in brochure. INTERNATIONAL NICKEL CO., INC. Page 2.

107 **Oxy-acetylene welding torch** with thumb lever control and built-in automatic gasaver is featured. WELDIT, INC. Page 5.

103 **Everything for resistance welding** electrodes, holders, castings and forgings, are featured in catalog. W W ALLOYS, INC. Page 6.

24 **Magnetic plate clamp for weld positioning** is introduced in descriptive literature. BUCK MFG. CO. Page 7.

77 **Resinoid bonded wheels for weld grinding** are featured in catalog describing new B-11 line. NORTON CO. Pages 8-9.

3 **Right electrodes. for specific jobs** are featured in Catalog 1318-IW. AIR REDUCTION SALES CO. Page 10.

106 **Plate bending rolls** and how they are used is explained in bulletin. WEBB CORP. Page 14.

73 **The inside story on oxy-acetylene regulators** is told in 44-page illustrated book. NATIONAL WELDING EQUIPMENT CO. Page 15.

25 **One source for all your welding needs** is the way in which new catalog is described. BURDETT OXYGEN CO. Page 17.

33 **Advantages of positioned welding** are explained in Circular WP26. CULLEN-FRIESTEDT CO. Page 18.

112 **Six features of 295-amp AC welders** are explained in Bulletin GEC-1305. GENERAL ELECTRIC CO. Page 26.

44 **New line of AC welders** and how it eliminates false starts and pop-outs is subject of literature. GENERAL ELECTRIC CO. Pages 24-25.

110 **Wide vision safety lens welding goggles** and how they give greater comfort and better protection is subject of catalog. WATCHEMOKET OPTICAL CO. Page 27.

40 **Test installation for electrode holders** and cable connectors is offered. ERICO PRODUCTS, INC. Page 29.

42 **Wide range of resistance welding equipment** for a variety of operations is featured in complete catalog. FEDERAL MACHINE & WELDER CO. Page 33.

80 **How to prevent electrode moisture pick-up** and eliminate weld rejects is explained in bulletin. PHOENIX PRODUCTS CO. Page 36.

32 **Stainless steel welding wire** for every application is featured in warehouse catalog. CRUCIBLE STEEL CO. OF AMERICA. Page 37.

18 **Ideal for users of small angles or flats** is the way in which new power shear is described. BATEMAN FOUNDRY & MACHINE CO. Page 38.

100 **Versatility through engineering** is the way six important features of DC welder are summed up. VICKERS ELECTRIC DIV. Page 39.

11 **The best on hand** is the way complete line of leather gloves and mittens are described. AMERICAN OPTICAL CO. Page 41.

58 **Complete line of oxy-acetylene welding and cutting equipment** is featured in 24-page catalog. K-G EQUIPMENT CO. Page 42.

36 **Welding wire catalog** features stainless steel and hard facing wires. DRAWALLOY CORP. Page 45.

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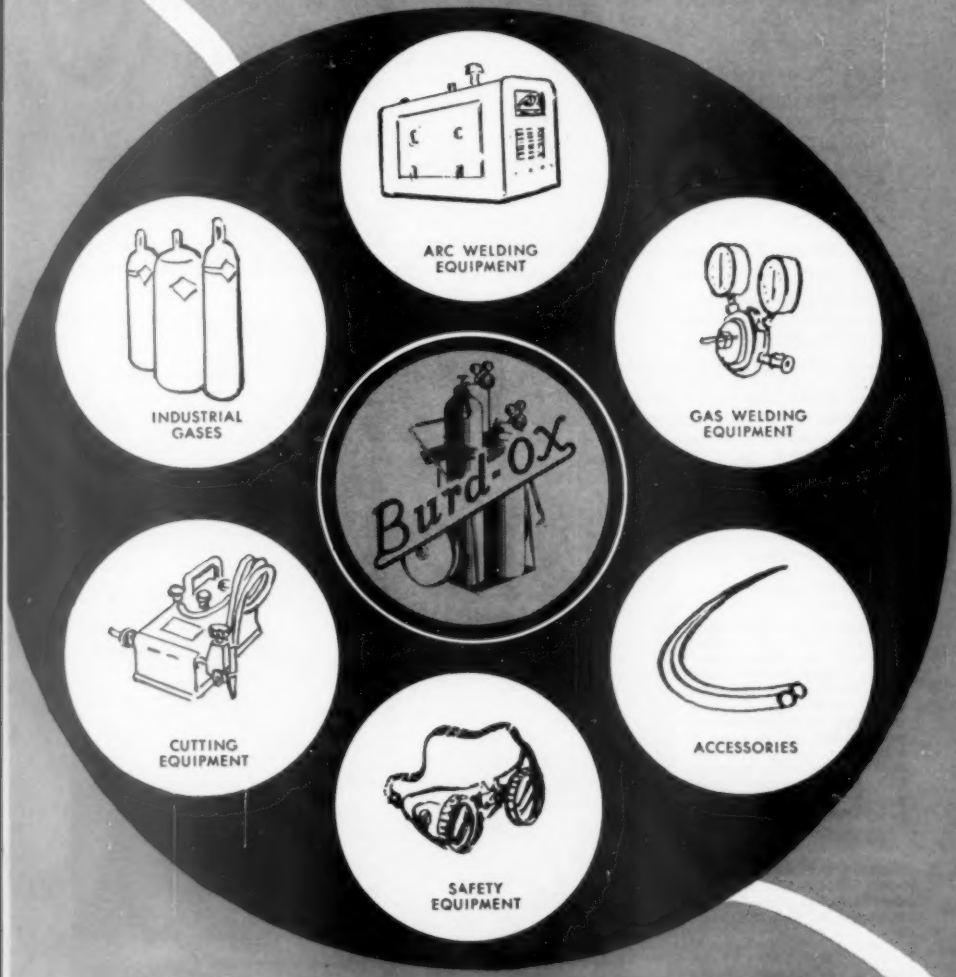
one CALL to BURDOX

supplies ALL your needs for welding, cutting and safety equipment



When you make BURDOX your one source for all your welding and cutting equipment and supplies you save time . . . labor . . . money! Since we handle products for all welding and cutting methods we not only recommend the best and most economical for your purpose, but supply your needs completely! You'll find by checking with BURDOX first, you'll do your welding or cutting jobs better . . . faster . . . at lower cost! Catalog on request.

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PLANTS: Cleveland, Dayton, Findlay, Mansfield, Youngstown, Ohio and Los Angeles, California.
BRANCHES: Akron, Cincinnati, Columbus, Ohio.

111 **Soft-arc, easy handling E6010 welding electrode** is featured in literature. WESTINGHOUSE ELECTRIC CORP. Page 47.

83 **Grinding wheels** for all industrial applications are featured in brochure. RAYBESTOS - MANHATTAN, INC. Page 49.

50 **"Automatic" oxy-acetylene welding torch** and how it increased production is explained in catalog. HARRIS CALORIFIC CO. Page 56.

9 **Low fuming bronze welding rods** are featured in Publication B-13. AMERICAN BRASS CO. Pages 62-63.

61 **General purpose welding electrode** and its features are included in weldirectory SB-1351 which gives specifications and procedures. LINCOLN ELECTRIC CO. Page 77.

54 **"A Handy Guide to Welding Cast Irons"** sounds like a handy reference book. Illustrated, book gives hints on preparation for welding and correct welding techniques. INTERNATIONAL NICKEL CO., INC. Pages 78-79.

22 **Completely portable 200 amp AC welder** is subject of descriptive folder. BRENNEN, BUCCI & WEBER, INC. Page 80.

96 **Comprehensive catalog** of resistance welding products is available. TIPALOY, INC. Page 81.

49 **Seven welders in one** is the way descriptive brochure tells about new AC/DC welder line. HARNISCHFEGER CORP. Page 82.

66 **How machined resistance welding forgings** can be made available at the cost of rough-forged blanks is explained. P. R. MALLORY & CO., INC. Page 90.

21 **Portable grinders that are built to last** are among the complete line of portable electric tools featured in

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand — that's efficient welding!

Welders spend more time welding — do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

Write for Bulletin WP26 —an illustrated circular detailing the specific advantages of C-F Positioners.

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C-F positioned welds mean better, more economical welds

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

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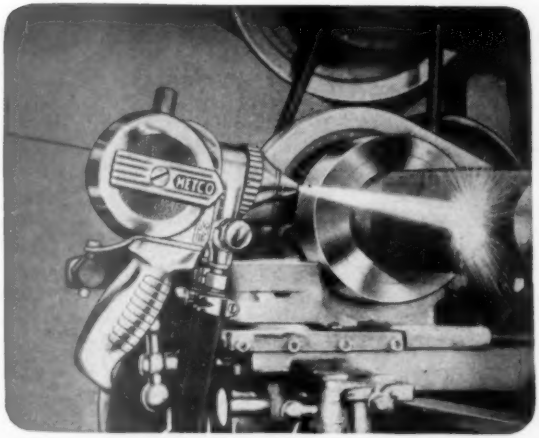

here's a really low-cost metallizing installation...

with the Metco L-Gun

Now, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

Metallizing damaged journals on turbine shaft

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Metallizing protective coating on steel plate

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
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- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

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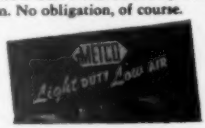
Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



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DYE PENETRANT INSPECTION

Non-visible crack as detected on carbide tool.

✓ *CONVENIENT—EASY TO USE*
Spotcheck—in pressurized spray cans.

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Detects cracks in tools, parts, machinery.

✓ *ENDS GUESSWORK ARGUMENTS*
Positively spots cracks, not scratches.

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catalog. BLACK & DECKER MFG. CO. Page 93.

79 **Automatic welding wire for every application** is featured in Folder DH-402 which gives information on 26 different wire analyses. PAGE STEEL & WIRE DIVISION. Pages 94-95.

23 **"Bronze-Welding — Modern Tool of Industry"** is interesting title of interesting booklet which features low-fuming manganese rod for all-purpose welding. BRIDGEPORT BRASS CO. Page 104.

41 **How to measure iron content in stainless steel welds** with new precision instrument is explained in catalog. FERRO CORP. Page 106.

7 **Complete information on joining of aluminum** can be found in handy pocket reference book. ALL-STATE WELDING ALLOYS CO., INC. Page 108.

28 **Protection equipment for every welding requirement** can be found in complete catalog. CHICAGO EYE SHIELD CO. Page 109.

67 **New oxy-acetylene welding torch** and three features which make it lighter, cooler and stronger are subject of illustrated catalog. MARQUETTE MFG. CO., INC. Page 111.

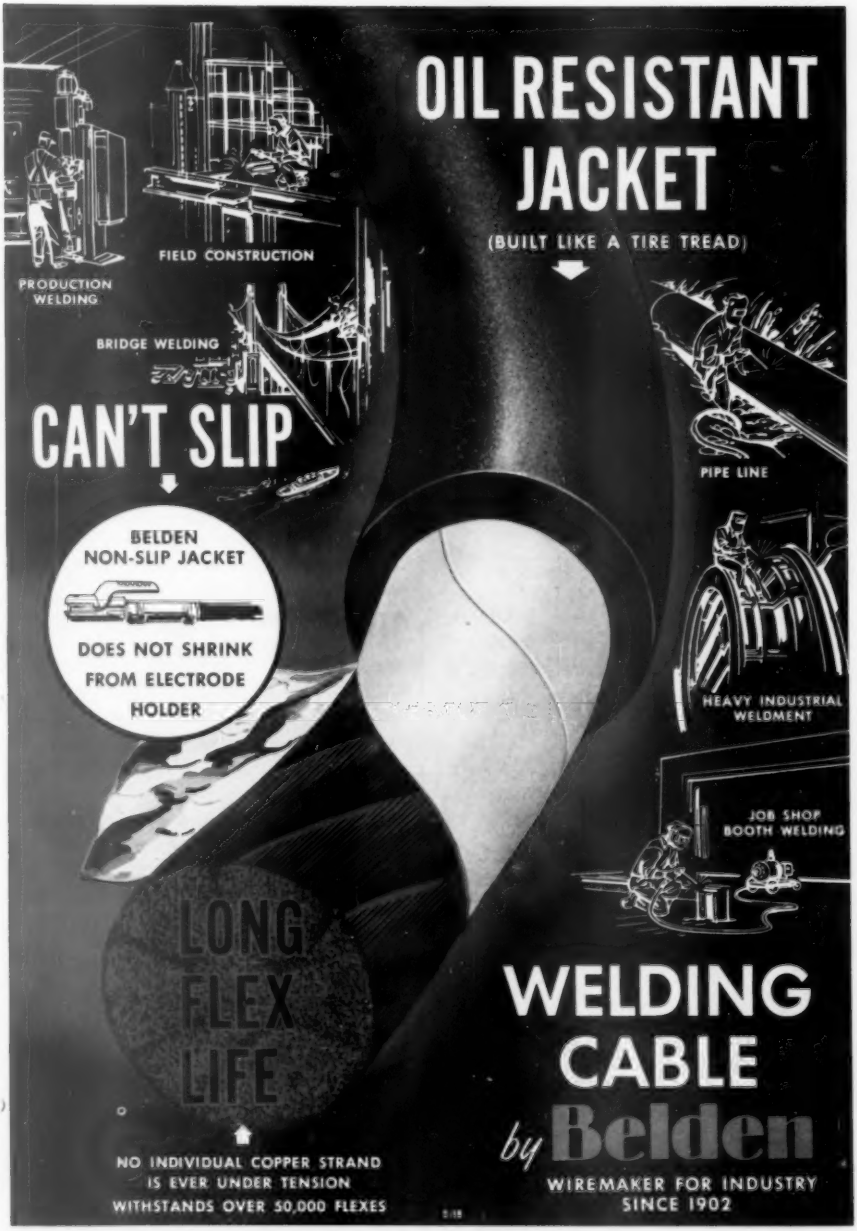
59 **How to save your face with welding helmets,** face shields and accessories is explained in catalog. KEDMAN CO. Page 111.

63 **All aspects of CO_2 welding are covered** in descriptive folder and technical bulletin. LIQUID CARBONIC CORP. Page 113.

88 **Treated welding curtains** and how they can confine fire danger is explained in catalog. A. SMITH & SON, INC. Page 114.

35 **Head and eye safety equipment** for every welding operations is listed in catalog. DOCKSON CORP. Page 115.

51 **Fourteen hard facing alloys** and how to use them is subject of catalog. HAYNES STELLITE DIV. Page 119.



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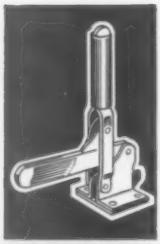
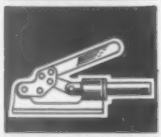
WESPO

TOGGLE CLAMPS





NOTE THESE IMPORTANT FEATURES:

1. **Reamed holes**—for better bearing
2. **Hardened Bushings, Serrated to prevent turning**
3. **High tensile strength rivets**—for longer service.

Corrosion resistant black oxydized finish.

A CLAMP FOR EVERY WORK HOLDING NEED

36 Sizes Available

WESPO TOGGLE CLAMPS are engineered and constructed for positive holding and light, medium and heavy clamping.

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DETROIT 19, MICHIGAN
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WRITE for FREE BULLETIN

Circle No. 108 on Reader Service Card.

98 **Welding cable costs** and how they can be cut with new aluminum welding cable is subject of free catalog. TWECO PRODUCTS CO. Page 121.

46 **Silver brazing alloys and fluxes** and how to use them is subject of Data Book. GOLDSMITH BROS. SMELTING & REFINING CO. Page 126.

70 **Where floor space is a problem,** new "Lowboy" DC rectifier-type welder is said to be ideal. Catalog describes complete three-model line. MILLER ELECTRIC MFG. CO. Page 129.

48 **Facts on silver brazing are cataloged in Bulletin 20.** HANDY & HARMAN. Page 130.

38 **Three new portable clamps** with trigger release are featured in Bulletin 482-4-6. DETROIT STAMPING CO. Page 134.

74 **Complete line of grinders,** sanders and polishers is featured in 4-page bulletin. NEDCO CO. Page 135.

105 **Cylinder trucks for all sizes of cylinders** are featured in catalog. WELDED TRUCK & SPECIALTY CO. Page 138.

45 **If your automatic welding power source is outdated,** you'll know it after you read literature on constant voltage welders. GLENN CO. Page 139.

1 **Bending blocks and welding platens** are featured in catalog. ACORN IRON & SUPPLY CO. Page 142.

57 **How fast, accurate pipe welding** is made possible with pipe clamps is subject of catalog. JEWEL MFG. CO. Page 142.

15 **Magnetic welding clamps** with a thousand uses are featured. ARONSON MACHINE CO. Page 143.

69 **Anti-spatter compound** is offered for trial usage. MIDLAND PAINT & VARNISH CO. Page 144.

37 **Complete line of electrode holders** is described in illustrated catalog. DURO ENGINEERING CO. Inside Back Cover.

YES, we were 1ST in

1. High impact Tip Insulators to reduce maintenance costs.
2. Interchangeable Tip Insulators to reduce maintenance stock requirements.
3. High heat resistant Plastic Tip Insulators to withstand higher temperatures near welding arc assuring longer life.
4. Plastic Handles to prevent moisture absorption and warpage as well as insulate glove from Holder heat.
5. High conductivity copper for lower tong to carry away inducted heat from rod, as well as high electrical conductivity.
6. Spring Adjustment Screw for ease of Rod release.

7. Wrap around Plastic Tip Insulation for maximum electrical insulation and heat resistance — 30% more than any other make.

AND NOW....

2 MORE FIRSTS

Wagner HI-AMP ELECTRODE HOLDERS

8. Brilliant Red and Yellow Plastic Colors insures identification of Holder anywhere in plant — Valuable Safety Feature.

YES—

WAGNER HI-AMP LEADS THE FIELD IN ELECTRODE HOLDERS

You will never use any other Electrode Holder once you actually "see" and "feel" the difference.

Visit our Booth 18 at Welding Show, Buffalo, May 9-11, 1956.

Sold only through Welding Supply Distributors throughout the U.S. and Canada.

WAGNER MANUFACTURING CO., *inc.*, JACKSON, MO.

Weld with Wagner

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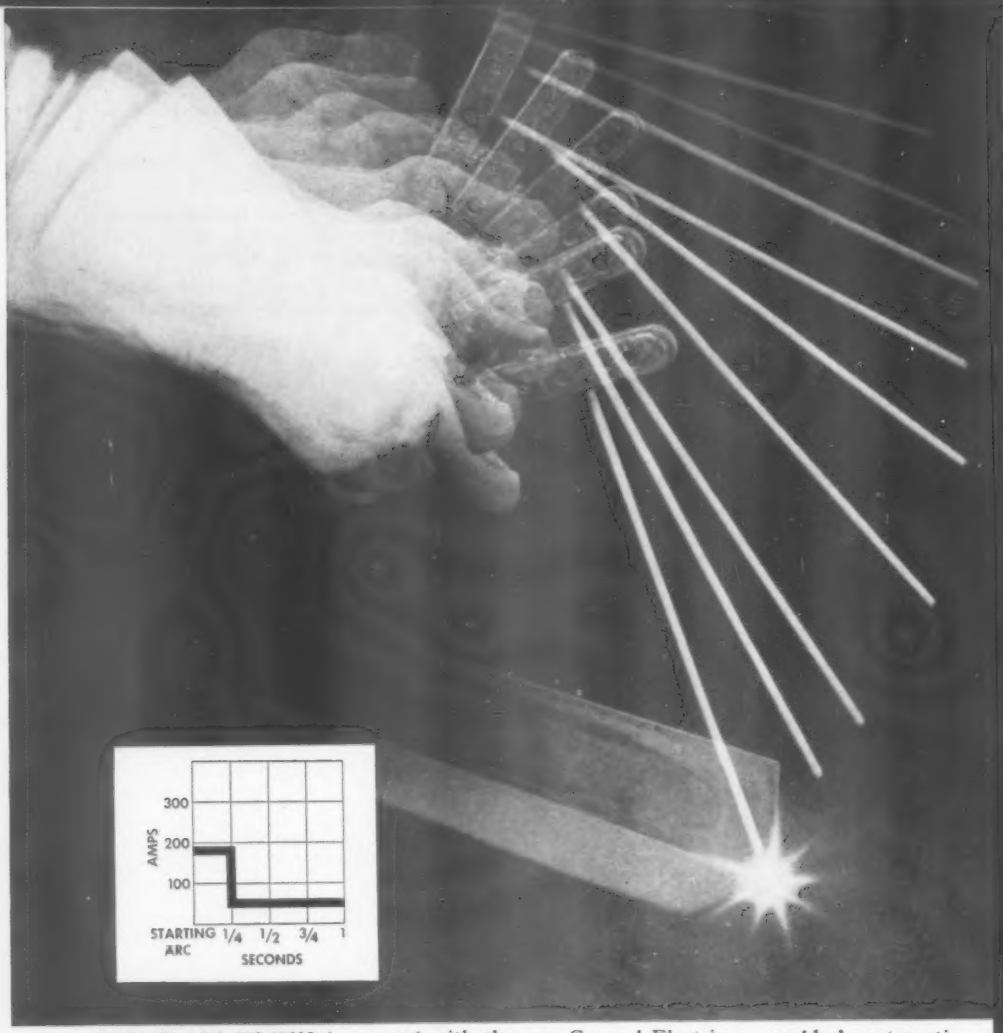

INSTANT ARC STRIKING is assured with the new General Electric a-c welder's automatic hot-start. Hot-start gives extra boost of current for ¼ second, eliminates false starting.

FOR ALL YOUR WELDING NEEDS . . .

A FULL LINE OF G.E. WELDERS AND ELECTRODES

G.E. offers all popular arc welders, electrodes, and accessories. This means that G.E. can give impartial recommendations on your welding needs.

G-E MOTOR-GENERATOR welders, in 200- and 300-amp sets, feature a unique interactor to eliminate popouts.

NEW G-E DC RECTIFIER welders (300 and 400 amps) feature G-E full-time arc-force control.

Circle No. 44 on Reader Service Card.

No False Starts . . . No "Popouts" With New G-E Line of AC Welders

Arc strikes instantly, stays steady—gives a sound weld from start to finish

Any professional weldor knows that better welds and easier welding begin with a good arc.

General Electric's new line of a-c transformer welders gives you this good arc—instant striking and steady—plus many other features that make your welding faster, easier, and more economical.

1. NO FALSE STARTS. G-E automatic hot start provides that necessary extra surge of current which assures you of instantaneous arc striking and extra penetration at the start of the weld.

2. ARCS ARE EASIER TO HANDLE, too. Popouts are practically eliminated because G.E. has made the normally stable a-c arc even more stable by the addition of special capacitors—which provide the equivalent of 5 additional open-circuit volts.

3. G.E.'s FINGER-TIP CONTROL design gives you pinpoint accuracy of current with the moving-coil design. You don't have to "crank" the handle on a G-E welder to change current settings. It smoothly moves the primary coil on a finely threaded, rubber-cushioned shaft to give you stepless current control.

SEE FOR YOURSELF the operating advantages of the G-E a-c welder line. Ratings are available in 300, 400, and 500 amps . . . and 295 amps for general-purpose welding. Contact your G-E Welding Distributor for a demonstration. He's listed in the yellow pages of your phone book.

GENERAL ELECTRIC

NEW 200-AMP engine-drive welder gives steady output, even when operated above full load.

G-E BALANCED DESIGN electrodes give you a combination of: ease of handling; X-ray quality; welding speed.

Section 711-3E
General Electric Co.,
Schenectady 5, N. Y.

Please send me the bulletins checked below:

- ☐ GEA-6243 G-E AC Welders
- ☐ GEA-6242 G-E Rectifier Welders
- ☐ GEC-664 G-E MG Welders
- ☐ GEC-1333 G-E Engine-drive Welder
- ☐ GED-2584 G-E Electrode Catalog

Name .....

Title ..... Co. .....

Street .....

City ..... State .....

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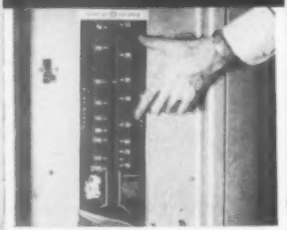
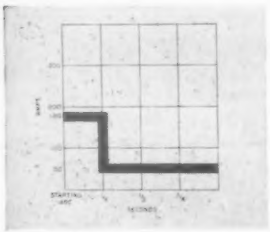
WELDING ARCS NEWS

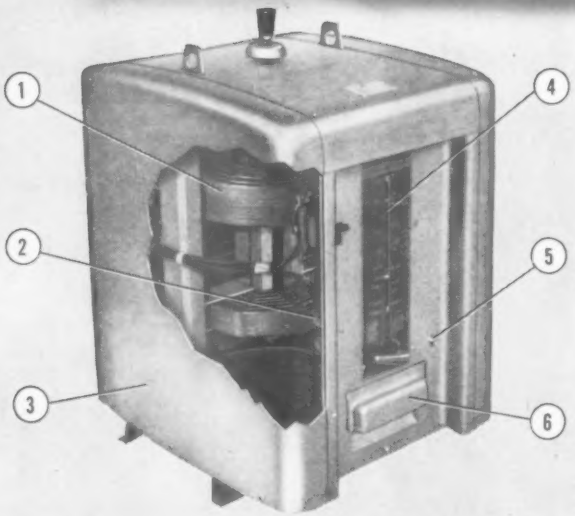


25 to 295 AMPS are spanned by extra-wide current range, which permits a wide number of varied applications.

SIDE COVERS LIFT OFF easily, with removal of just 3 screws. Maintenance and inspection are simplified.



AUTOMATIC HOT-START gives extra surge of current on electrode contact, reducing sticking, false starting.



How G-E 295-amp AC Welders Provide Big-welder Benefits At Small-welder Price

G.E.'s 295-amp a-c welder is designed for light-duty, general purpose welding—but offers features usually found only in more expensive, heavy-duty welders:

1 MOVING-COIL DESIGN gives pinpoint accuracy in current settings and resettings over a wide current range.

2 ARC STABILIZERS provide the equivalent of 5 open-circuit volts, making the steady a-c arc even steadier.*

3 REMOVABLE SIDE COVERS come off with removal of just three screws, simplifying maintenance.

4 WIDE CURRENT RANGE spans 25 to 295 amps.

5 AUTOMATIC HOT-START assures instant arc striking by providing an extra surge of current on contact.*

6 UNIVERSAL BOLT-TYPE TERMINALS at base eliminate hazards of dangling leads.

For details see your G-E Welding Distributor or write Section 712-2E, General Electric Company, Schenectady, N. Y. for Bulletin GEC-1305.

** Improved arc-performance features, available optionally*

GENERAL ELECTRIC

erated above full load. quality, welding speed. City State

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NEW EYE SAVERS

Wide Vision Safety Lens Welding Goggles

MODEL 490 G4

Soft Vinyl Frame form-fits face for greater comfort, better protection.

Wide Vision Methacrylate Lens With New Colorant Formula

Provides new high percentage absorption of harmful ultraviolet and infra-red rays for protection against glare of acetylene cutting and welding and for stand-by in arc areas. Smokey green colors, in various densities, scientifically developed to provide maximum view of working details. Available in Light Green (G2), Medium Green (G4) and Dark Green (G6).

NOTE: *Does not meet Federal Specifications for glass filters.*

WATCHEMOKET eye SAVERS

Designed for Safety, Comfort, Better Vision and Economy . . .

Safe, Shatter-proof Lens Easily Replaced — Does not pit . . .

Eye Savers Lenses will not shatter or splinter with impact . . . will not pit. Lenses are easily replaced by removing the "lock bar" that positively locks the lens in the frame. No special tools needed.

Safer, More Comfortable Frame — Easy To Wear . . .
Eye Savers soft vinyl frames form-fit any shape face comfortably. Flanged nose bridge fills the gaps around the nose to assure greater protection. Adjustable, elastic headband holds goggles in position.

Full Vision Lens — Large Frame . . .
Extra wide 6" lens in the large vinyl frame provides ample space for metal or horn rimmed glasses. Frame forms a bumper that prevents the lens surface from touching when goggle is laid flat on a table or bench.

Stac-Vent Reduces Fogging . . .
A new principle in goggle ventilation, Stac-Vent, proven to provide clearer fog-free vision, more comfort and greater safety. MODEL 440 clear frame and MODEL 460 Transparent Green Frame Goggles available with Clear or Green Lenses.

MODEL 492 available with lens holder and 50 mm Federal Specification glass welding filters — No's 3, 4, 5, 6

See your Authorized Eye Savers Supplier, or write direct for full information on the New Welding Goggle and other Eye Savers.

ALMOST 100% PROTECTION with VISOR-TUC EYE SAVERS

MODEL 422 G4FC

Almost 100% protection in a lightweight, comfortable spectacle with over-eyes visor protection and semi-cup side shield protection. Furnished with medium green (G4) or dark green (G6) methacrylate lenses.

Ideal for wearing under welding helmet and for working in welding areas. Replaceable lenses snap-in-out; Retrax temple telescopes to perfect fit and easy comfort. Visor-Tucs weigh slightly over an ounce.

Quality Eye Protective Equipment ***Made by the Leaders in Plastics***

WATCHEMOKET OPTICAL CO., INC.

234 West Exchange St. PROVIDENCE 3, R. I. *In Canada: Levitt-Safety Limited, Toronto 10, Montreal 2(*

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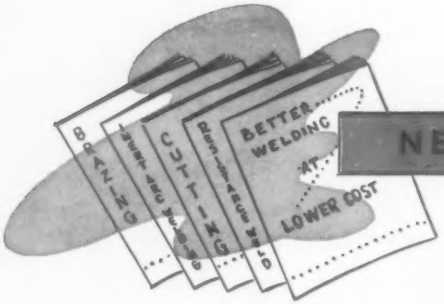


NEW REFERENCE DATA

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use postcard bound into this issue.

TORCH FOR INERT GAS SHIELDED ARC WELDING has quite a story behind it. Made by Tec Torch Co., Inc., torch has pencil grip and transparent gas cup. Advantages are outlined and specifications given in detail. **Circle No. 94 on Reader Service Card.**

TUBE AND PIPE NOTCHING TOOLS AND CUT-OFF MACHINES are described in a folder from Vogel Tool & Die Corp. Notching tools are said to make perfect joints for welding or brazing, cut clean edges and eliminates any need for further finishing. **Circle No. 102.**

CO_2 SYSTEMS FOR INERT GAS WELDING are described in Form ADPC-26 offered by Pure Carbonic Co., division of Air Reduction Co., Inc. Complete information is included on supply systems for use in the welding industry. Gas flow obtained from each unit is given. Applications are illustrated. **Circle No. 115 on Reader Service Card.**

PORTABLE SPOT WELDER HAS BUILT-IN TIMING CONTROL. A light, portable production welder, said to take the guess work out of spot welding. Literature prepared by Ross Machine Tool Co., shows how unit can be quickly converted to a foot-operated floor model. **Circle No. 116 on Reader Service Card.**

A NEW THREE-IN-ONE FILLER ROD for use with oxy-acetylene flame is introduced in data sheet from Ampco Metal, Inc. Discussed is a new all-purpose, non-fuming, nickel-brass brazing rod which can be used for brazing weld-brazing or overlaying. **Circle No. 12 on Reader Service Card.**

IMPACT AND CORROSION-RESISTANT STEEL PLATE, SHAPES AND FORMS are featured in literature from Allied Steel & Tractor Products, Inc. Characteristics are given and welding techniques are suggested. **Circle No. 5 on Reader Service Card.**

IS DIAMOND SWARF WORTH COLLECTING? Definitely! Says the Norton Company . . . and they've got an interesting customer service bulletin that explains why the reclamation of diamond from swarf and wheel stubs is important. **Circle No. 117 on Reader Service Card.**

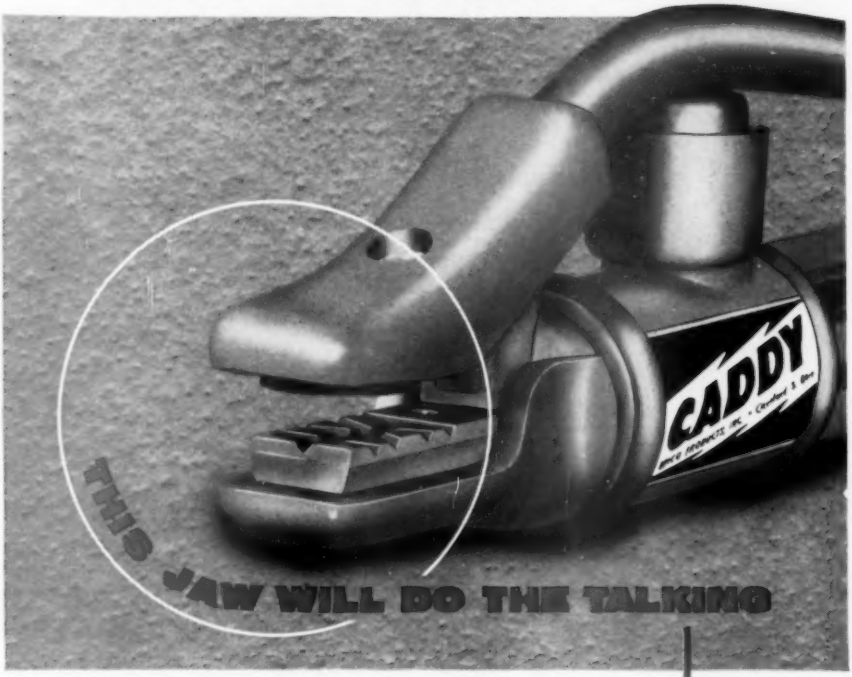
TOGGLE CLAMPS FOR EVERY WORK HOLDING NEED are featured in a complete catalog offered by West Point Mfg. Co. Thirty-six sizes in a variety of styles for light, medium and heavy-duty and applications are described and illustrated. **Circle No. 108 on Service Card.**

COMPLETE CLAMP CATALOG offered by Cincinnati Tool Co. features a line of clamps for every industrial application. Heading the list are welding clamps with spatter-resisting screws. Selection and application information is furnished. **Circle No. 30 on Reader Service Card.**

NEW AIR-COOLED INERT GAS SHIELDED ARC WELDING TORCH for the welding of light metals, developed and introduced by Linde Air Products Company, is effectively described in their latest release. **Circle No. 118 on Reader Service Card.**

Turn to Page 30 For More Useful Literature.

NO CLAIMS



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ARC WELDING ACCESSORY DIV.
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ERICO PRODUCTS, INC.
2070 E. 61st. PLACE CLEVELAND 3, OHIO

☐ Send CADDY CATALOG.

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COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Circle No. 40 on Reader Service Card.

HOW TO ELIMINATE MOISTURE ABSORPTION in welding electrodes is explained in data sheet offered by Despatch Oven Co. Described in detail and illustrated is "WRD" oven which holds 250 lbs. of electrodes in 10 separate compartments. **Circle No. 34 on Reader Service Card.**

POSITIONERS AND TURNING ROLLS, which powerize welding jobs with speed and precision, are featured in literature offered by Pandjiris Weldment Co. Cataloged are positioners with capacities up to 140,000 lbs. and turning rolls that can handle weldments up to 400,000 lbs. **Circle No. 78 on Reader Service Card.**

CORROSION, ABRASION, AND CONTAMINATION RESISTANT LININGS for pipe, valves, and similar storage and process equipment have been presented in a new catalog issued by Manhattan Rubber Division, Raybestos-Manhattan, Inc. Illustrations include useful charts, tables and diagrams. **Circle No. 119 on Reader Service Card.**

LIST OF TECHNICAL ARTICLES, APPLICATION BULLETINS, BOOKS, AND WALL CHARTS has been prepared by North American Philips, Inc., and is available to interested parties. Coverage includes the fields of X-Rays, Communications, Welding. **Circle No. 120 on Card.**

RUGGED AND DEPENDABLE CHIPPING HAMMERS are the subject of illustrated folder from Chicago Manufacturing & Distributing Co. Featured three types of wood handled tools and four types of steel handled tools, all with rugged forged steel heads. **Circle No. 29 on Reader Service Card.**

COMPLETE WELDING ACCESSORIES CATALOG is currently available from Jackson Products. Described in detail and illustrated is complete line of welding electrode holders and safety hats and helmets, including combinations of the last two. **Circle No. 56 on Service Card.**

LIFTING AND POSITIONING CLAMPS with new safety-snap lock feature are described in 14-page illustrated catalog from J. C. Renfroe & Sons, Inc. application data is given. **Circle No. 84 on Reader Service Card.**

SEMI-STEEL WELDING TABLES with built-in accuracy are featured in literature from Challenge Machinery Co. Booklet described special T-slot construction and different sizes of tables which can be used for spot welding and heavy-duty arc welding. **Circle No. 26.**

LOW-COST METALLIZING INSTALLATIONS are discussed in Bulletin 55 available from Metallizing Engineering Co. Described in detail and illustrated is company's versatile Metco L-Gun. **Circle No. 68 on Service Card.**

SAFEST SNAGGING WHEEL AVAILABLE TODAY is the way Metal Removal Co. describes its Saf-Tex wheels. Featured are fabric-reinforced wheels for heavy portable snagging, cut-off work and notching. **Circle No. 121 on Reader Service Card.**

USE THE READER SERVICE CARD
FOR VALUABLE REFERENCE DATA

A CHIN-OPERATED WELDING HELMET is featured in literature from Welding Apparatus Co. Described in detail is adjustable chin rest which makes it possible for operator to lift or drop helmet with a natural movement of his chin. **Circle No. 122 on Reader Service Card.**

1,000 SPECIALIZED SPOT WELDING GUNS and how they can be made from a single standardized model is the subject of bulletin from Progressive Welder Sales Co. Secret is the use of interchangeable cylinders, jaw extensions, electrode adapters and tips. **Circle No. 82 on Service Card.**

Turn To Page 32

Milwaukee

Heavy-Duty

SANDER-GRINDER

5000 RPM

with EXCLUSIVE Coaster Brake CLUTCH DRIVE

UL SA APPROVED

Model U-199W

Complete with ABRASIVE wheel and Steel Grinding Guard

Only $89.50

Built Specifically *For The Welder...*

No matter how big or bulky your weld grinding, disc sanding or wire brushing jobs, you'll cut costs and speed up work when you switch to dependable MILWAUKEE power.

Powered by full 1½ HP ac-dc motor, tailor-made by MILWAUKEE to stand the gaff of every day heavy-duty service. Its high disc speed (5000 rpm) removes metal fast and because it's light weight, perfectly balanced and easy to handle, it cuts way down on operator fatigue.

Write for free folder SG2 for complete facts about this outstanding tool.

MILWAUKEE ELECTRIC TOOL CORP.

5318 W. State St. Milwaukee 8, Wis.

Circle No. 71 on Reader Service Card.

HARDSURFACING ALLOYS are featured in literature available from Coast Metals, Inc. Brochure contains welding specifications, characteristics of deposits and application methods for complete line of electrodes, rods and coils. **Circle No. 31 on Reader Service Card.**

HEAVY-DUTY GRINDERS FOR WELD FINISHING OPERATIONS are featured in literature from Gaston Power Tools. Described in detail is simple, rugged construction, dust-free motor and absence of commutators or gears which could cause increased maintenance. **Circle No. 123 on Reader Service Card.**

TWENTY-THREE DIFFERENT SIZES OF MANGANESE-NICKEL WEDGE BARS are pictured in actual size on handy 24 x 36-inch wall chart offered by Stulz-Sickles Co. Also listed are complete dimensions and estimated weights on company's 11-13½ percent manganese-nickel steel flat, round and square applicator bars. Specifications are included for hot rolled plate in seven thicknesses and several stock sizes. **Circle No. 113 on Service Card.**

GLOVE LEATHER SPLITS for use in gloves for welding operators and industrial workers are featured in literature from General Split Corp. Highlighted is super-chrome tanned cowhide split that gives increased heat resistance and softness. **Circle No. 124 on Service Card.**

IRON POWDER LOW HYDROGEN ELECTRODES are featured in Data Sheet offered by Alloy Rods Co. Complete information is given on application, physical properties, chemical analyses and welding procedures for Atom Arc electrodes which is said to be ideal for all-position welding. **Circle No. 6 on Reader Service Card.**

Turn To Page 34

the **ARC-TWIN** *Cuts Two Perfect Notches*

in *One* Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2⅜" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.

Ask for twin-notched sample of pipe or tubing

PATENTED

VOGEL TOOL AND DIE CORPORATION 1819 North 32nd Ave Melrose Park, Illinois

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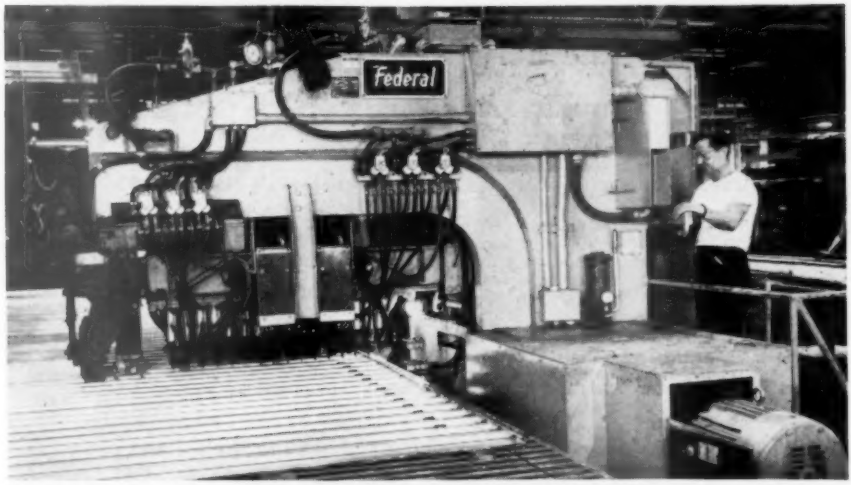
HOW Federal HELPS BUDD . . .



BUILD BETTER SUB-ASSEMBLIES FOR STAINLESS STEEL TRUCK TRAILERS

Welding trailer side panel sections of stainless steel for the popular new Fruehauf Volume Van required special welding machines. The Budd Company, one of the nation's largest manufacturers of transportation equipment, naturally, turned first to Federal.

Federal, in cooperation with Budd, designed and built an ingenious "C" frame multi-spot traveling welder that turned the difficult job of welding side frame panels and structural skirt sections into a high production operation.

Self-propelled on 120 feet of rail, the machine travels over the work which is laid horizontally on a copper shunt die back-up fixture. It features an adjustable slow speed for indexing with a rapid traverse for return. Two rows of tandem piston, double-acting air guns are indexed at right angles to the line of welder travel to permit close spot welding. The machine automatically positions itself and selects gun sequence. Operator, riding with the machine, always has clear view of work, ready access to controls.

If your operation calls for special resistance welding — you, like leading manufacturers, should call on *Federal — First in Resistance Welding.*

Federal® WELDERS

Warco PRESSES ®

5801-A

WELDING SHOW

BOOTH No. 73

THE FEDERAL MACHINE AND WELDER CO.

WARREN, OHIO

Circle No. 42 on Reader Service Card.

DC RECTIFIER WELDERS and eight important features are subject of Bulletin GEA-6242 offered by General Electric Co. Described in detail and illustrated is new reversible cleaning-cooling fan which gives up to 50 percent linger welder life. **Circle No. 47 on Reader Service Card.**

PRESSURE-COMPENSATING REGULATORS, which offer two-stage performance at single-stage cost, are featured in literature offered by National Cylinder Gas Co. Described in detail and illustrated is new Torchweld Series 6850 regulators. **Circle No. 125 on Service Card.**

CHOOSING THE RIGHT POSITIONER or turning rolls for specific jobs is made easy with a new, illustrated booklet issued by Aronson Machine Co. Photographs and simple diagrams explain function of different equipment types. **Circle No. 16 on Reader Service Card.**

COMPLETE RANGE OF ARC WELDING MACHINES manufactured by Precision Welder Mfg. Co. is described in their latest bulletin No. P-A16FA. Illustrates machines for light production welding, maintaenance and job-shop use and for heavy-duty production welding. **Circle No. 126.**

"A COMPLETE GUIDE TO SELECTIVE FLUXING for low temperature silver brazing" is the long title of a handy, compact guide book published by American Platinum Works. Pocket-sized booklet gives hints on correct selection of flux based on specific temperature ranges and metals to be joined. Flux selector chart is included and proper fluxing techniques described. **Circle No. 127 on Reader Service Card.**

HOW TO SPOT CRACKS IN WELDS AND CASTINGS is explained in illustrated booklet offered by Magnaflux Corporation. Described in detail is company's dye penetrant inspection method. **Circle No. 64 on Reader Service Card.**

WELDING CABLE WITH OIL RESISTANT JACKET is the subject of an illustrated brochure offered by Belden Mfg. Company. Built like a tire tread, cable's jacket is said not to slip nor shrink from electrode holder. **Circle No. 16 on Reader Service Card.**

TWO NEW FEATURES ON ELECTRODE HOLDERS made by Wagner Mfg. Company are featured in descriptive literature. Explained is wrap around plastic tip insulation and new color identification system. **Circle No. 104 on Reader Servce Card.**

HOW TO STOP BRAZING ALLOY WASTE is explained in literature from Wall-Colmonoy Corp. Illustrated catalog describes and explains company's Nicrobraz Green Stop-Off which limits flow of brazing alloys to joint area. **Circle No. 109 on Reader Service Card.**

COMPLETE LINE OF WELD CHIPPING HAMMERS is featured in literature available from Atlas Welding Accessories, Inc. Described in detail are hammers with induction hardened heads and wooden or steel handles. **Circle No. 17 on Reader Service Card.**

GRINDING WHEELS GUARDS for all types of portable grinding and weld finishing tools are featured in a catalog now available from Morrison Products Co., the country's largest manufacturer of guards for grinding machines. **Circle No. 72 on Reader Service Card.**

Turn To Page 36

New AMPCO-BRāZ #1 —a "3-in-1" Filler Rod

● *silver-like, high-strength joints* ● *low-friction overlays with good bearing qualities* ● *corrosion and wear resistance*

Ampco-Brāz # 1 is a non-fuming, low-melting-point rod that permits both joining and overlay with the oxy-acetylene process. It gives you attractive welds with high strength. It is also excellent for tough overlays.

Many copper-base, iron and nickel-base metals and alloys can be joined with this new copper-alloy filler rod. It produces welds of 85,000 p.s.i. tensile strength and 160,000 p.s.i. shear strength without warpage or distortion. Ampco-Brāz # 1 also resists wear and corrosion.

Ideal for all-position welding and easy to apply — uses ordinary brazing fluxes and techniques. Low bonding temperature and low melting point results in smooth, dense, free-flowing deposits.

Order new Ampco-Brāz # 1 from your nearby Ampco distributor or write us for more information.

AMPCO

AMPCO METAL, INC.

Dept. IW-4 • Milwaukee 46, Wisconsin
West Coast Plant • Burbank, California

W-138A

Circle No. 12 on Reader Service Card.

HEAVY-DUTY SANDER-GRINDER and its exclusive coaster brake clutch drive is subject of free folder SG2 offered by Milwaukee Electric Tool Corp. Described in detail is units which is said to be ideal for weld grnding, disc sanding or wire brushing job. **Circle No. 71 on Reader Service Card.**

AN INDUSTRIAL AC WELDER guaranteed for one year is subject of brochure from Trindl Products, Ltd. Said to be ideal for use on farm, in repair and other maintenance operations, welder operates on 110 or 220 volt current, handles electrodes up to 5/32-inch diameter and welds up to ½-inch plate. **Circle No. 128 on Reader Service Card.**

HAND-OPERATED, BENDER, BAR SHEAR AND ANGLE which requires little skill to operate, is presented to metal working people in an informative bulletin No. L-101, made available by the manufacturer, Diesel Power, Inc. **Circle No. 129 on Reader Service Card.**

PORTABLE SAND BLAST GUN that will handle silica sand, metal shot, alumnous oxide, and other abrasives for sand blasting parts, for removing rust scale, paint and dirt, is shown in Lindberg Products Company's latest brochure. Includes price data. **Circle No. 130 on Card.**

CLAMPS DESIGNED FOR WELDING is the way in which Chicago Boiler Co. describes its "Red Head" welding clamps. Literature from the company describes the clamps' solid plate body and threads that are protected from weld splatter. **Circle No. 27 on Reader Service Card.**

GLOVES FOR WELDING OPERATORS are featured in illustrated brochure from Sabin Glove Co. Compete line of clothing for welding operators. **Circle No. 131 on Reader Service Card.**

Turn to Page 38

Are REJECT WELDS killing your profits?

avoid scrap loss, reworks with DryRod Electrode Oven!

Engineers say most defects in high-strength welds — X-ray porosity, rough welds, underbead cracking, etc. — are caused by moist electrodes. DryRod — the original shop-tested *circular* electrode oven — safely preserves the manufacturer's "baked-in" quality . . . keeps rods within the .2% moisture limit allowed. Protect yourself against costly rejects, reworks, scrap loss . . . preserve electrodes conveniently, at low cost, with DryRod. Write for free bulletin.

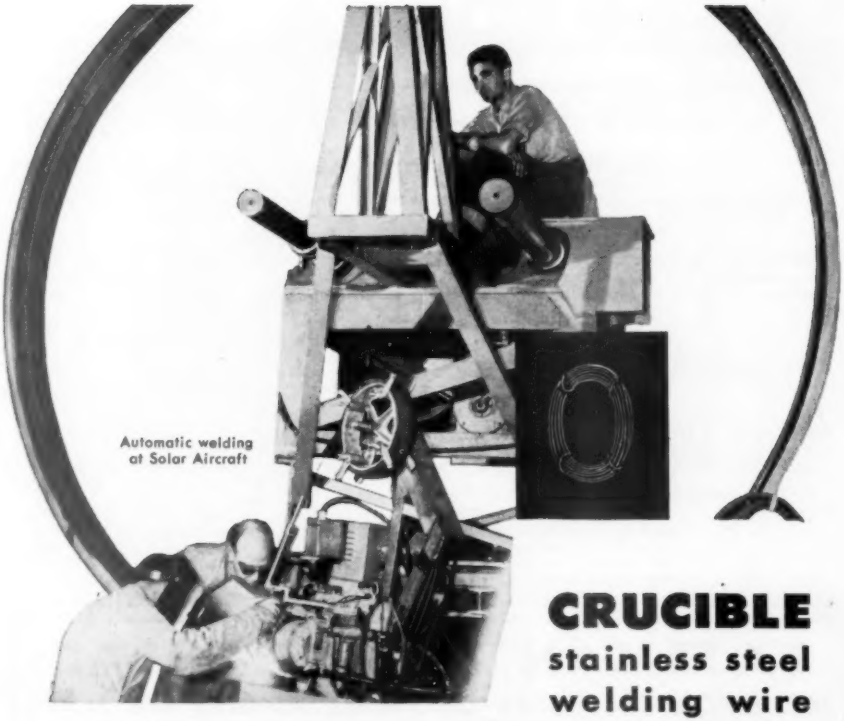
Type 300 Oven

Automatic thermostatic control, 175 to 550° . . . holds 350 lbs. of 18" rods . . . safe, adequate 840-watt heater . . . completely wired for 110/220 or 220/440 volt AC . . . sturdy welded-reinforced sheet metal construction . . . insulated — low heat loss, low upkeep.

DryRod—Trademark X-DR-13

DryRod DIVISION OF **Phoenix Products Co.**
4715 N. 27TH ST., MILWAUKEE 16, WIS.

Circle No. 80 on Reader Service Card.



Automatic welding at Solar Aircraft

CRUCIBLE
stainless steel welding wire
for faster, cleaner, uniform weld quality

Save time and money . . . get better weldments with Crucible stainless steel welding wire. For Crucible welding wire is made by *steelmen* for optimum performance on the job.

You can get these superior welding wires for any type of automatic welding . . . in most stainless grades and sizes . . . and in spools, coils and cut lengths.

They're all quickly available through your nearby Crucible warehouse. Next time you need stainless welding wire call Crucible. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Circle No. 32 on Reader Service Card.

EVERYTHING FOR RESISTANCE WELDING is described in literature from Robt. W. Hoffman Co. Featured are new, used and rebuilt machines. Spot welder air conversion units, automatic butt welding attachments, dies and accessories are also covered. **Circle No. 53 on Card.**

KNOW-HOW ON BENDING PIPE AND STRUCTURAL SHAPES is included in Catalog No. 50, along with the latest specifications for pipe and structural shape benders manufactured by the Wallace Supplies Co. Storehouse of useful technical information. **Circle No. 132 on Reader Service Card.**

AUTOMATIC WELDING IS EASY if you use the correct welding fixtures. Literature from Lewis Welding and Engineering Corp., describes in detail a complete line of stand and special fixtures, including welding head manipulators in automatic welding. **Circle No. 60 on Card.**

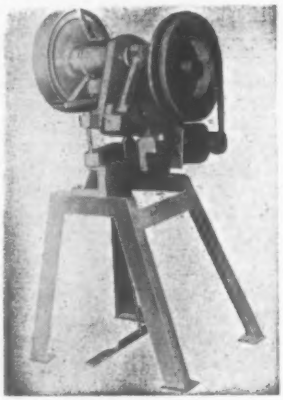
PRODUCTION BRAZING, ANNEALING UNITS—CONVEYOR AND TURNTABLE TYPES, are presented in an interesting two color Bulletin, No. 511, available from Gas Appliance Service, Inc. Describes how to achieve volume production at low cost. **Circle No. 133 on Reader Service Card.**

"THE FLUX IS IN THE FLAME" is the title of The Gasflux Company's latest brochure which describes advantages of the process, and applications in the production brazing field. Several installations are described and cost data is shown. **Circle No. 134 on Reader Service Card.**

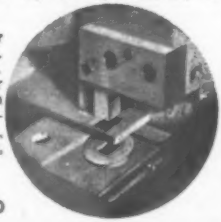
IRON CONTENT OF STAINLESS STEEL WELDS is easily measured with a new instrument introduced by Ferro Corp. Precision instrument is said to replace destructive laboratory analysis and make possible rapid, on-the-spot, non-destructive tests for iron content at various points along a weld. **Circle No. 41 on Reader Service Card.**

BATEMAN POWER SHEAR

IDEAL FOR THE USERS OF SMALL ANGLES OR FLATS



- **No grinding necessary after cut.**
- **Cuts angles up to 2" x 2" x ¼" and flats up to ¼" x 4".**
- **Flywheel with a gear drive for power with a small motor.**
- **A one stroke cycle clutch operated by either hand or foot.**
- **With clutch open, will make 44 strokes per minute.**
- **Made of high grade cast iron, hardened clutch and clutch pin, shear steel blades.**
- **From floor to top of machine—56" with stand. Floor to shear blade—36". Floor space required—24" x 27".**
- **With notched blade—will cut up to ¾" rounds, or ⅝" reinforcing rod.**
- **Special blade and punch for ornamental iron work.** ¾ HP. motor required for power. We furnish 2-groove motor pulley and 2 belts when ordered without motor. Shipping wt. approx. 485 lbs., without stand. With stand, 560 lbs.



WITH MOTOR AND STAND $450.00

BATEMAN FOUNDRY and MACHINE CO. • Mineral Wells, Texas

Circle No. 18 on Reader Service Card.

VERSATILITY
...THROUGH ENGINEERING

another Vickers FIRST for better welding

VICKERS
Controlarc DC Welder

Dependable service on a wide range of applications. Excellent in its performance on hard-to-weld jobs.

Maintains good arc stability through the complete current range without range switches.

Gives complete automatic arc control in any welding position.

Patented Magnetic Amplifier combines fine control with ruggedness.

Can bend the volt-ampere curve to meet particular jobs.

Can strike arc without the use of high frequency when using inert gas and tungsten at extremely low currents.

Exclusive dual remote control equipment available.

See our exhibit at the Welding Show • Some territories open for qualified dealers. Write for details.

WRITE TODAY for complete information and literature.

VICKERS ELECTRIC DIVISION

VICKERS INCORPORATED a unit of Sperry Rand Corporation
1855 LOCUST STREET • SAINT LOUIS 3, MISSOURI

Circle No. 100 on Reader Service Card.

High up in the steelwork where it's windy and exposed, welding can be a problem. But weldors are enthusiastic about Atom • Arc, not only for its speed but for its ease of operation in all positions and its materially reduced spatter.

Welded with ATOM•ARC 7016

Dominion Bridge Company of Canada is using Atom • Arc 7016 iron powder, low hydrogen electrodes* in welding the steelwork for this 21-story hotel. It's Canadian National Railway's new 20-million dollar Queen Elizabeth Hotel in Montreal.

Joining the lighter beams to the heavy columns without preheating called for low hydrogen electrodes. Atom • Arc 7016 electrodes in ½" diameters were adopted with the approval of both the weldors and Canadian National's inspectors. Along with the essential advantages of highest physical properties, x-ray quality weld metal and freedom from underbead cracking, Atom • Arc electrodes have a deposition rate much greater than standard 6010 electrodes. Starting porosity is eliminated and moisture pick-up is reduced.

Atom • Arc iron powder, low hydrogen electrodes have become standard on many structural and fabricated equipment welding operations. Find out why Atom • Arc is the first choice of users—write today for complete information. Alloy Rods Company, York 1, Pennsylvania.

VISIT OUR BOOTH #79
at WELDING SHOW
MEMORIAL AUDITORIUM
Buffalo, N.Y.,
May 9-12, '56

Alloy Rods Co.

General Offices and Plant
Lincoln Highway West
YORK 1, PENNSYLVANIA

Pacific Coast Sales Office and Plant
750 Lairport Street
EL SEGUNDO, CALIF.

no finer electrodes made . . . anywhere

***ATOM • ARC is sold in Canada by Canadian LIQUID AIR Company, Ltd.**

Circle No. 6 on Reader Service Card.

For Comfort . . .
Protection . . .
Wearing Qualities
AO® Welders Gloves
are the
BEST ON HAND!

9X503
Split leather, Montpelier pattern. All seams welted for extra protection.

1514
Asbestos. Reinforced on palm and thumb with chrome-tanned split cowhide. 14" long.

SCTX200
Cowhide. Standard length Gunn style, Flat seam double stitched at base and palm. One piece back and wing thumb. Lined on back.

In our complete production of gloves and mittens for welders, AO offers 2 quality lines in leather (Drednaut and 9X) and a quality line in asbestos. There is hand protection to meet every welder's need, preference and size.

AO Leather gloves and mittens are made from selected chrome-tanned skins to resist heat and cut generously for freedom and comfort. While tough to withstand severe wear the leather stays soft and flexible. Gauntlets are large enough to tuck in sleeves. Linings help prevent chafing, absorb perspiration, give extra insulation. AO Asbestos gloves are recommended for operations where heat is extreme. Your nearest AO Safety Products Representative can supply you.

American Optical
SAFETY PRODUCTS DIVISION

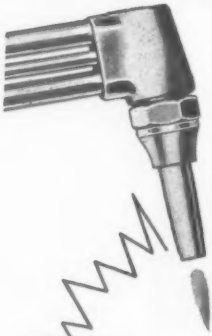
SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Circle No. 11 on Reader Service Card.

Circle No. 6 on Reader Service Card.

Ask Your K-G Distributor to Demonstrate These Two Amazing Products

STOP Discarding Damaged Cutting Tips



Get the torch with a

"TIP REPAIR SHOP"

Right in its Head!

K-G M38 CUTTING TORCH

In roughest service, absolutely impervious to flashback!

Even SAND Won't Stop Them!

Since oil and oxygen don't mix

Let Your K-G Distributor Make This Demonstration

Amazing filter action keeps out foreign matter — the basic cause of *seat failure*. Operate perfectly even after sand has been poured into the oxygen inlet! Complete disassembly, reassembly in three minutes with no special tools! *Folder on request.*

Visit Booth 41
Welding Show
Buffalo, N. Y.
May 9-11

Revolutionary New

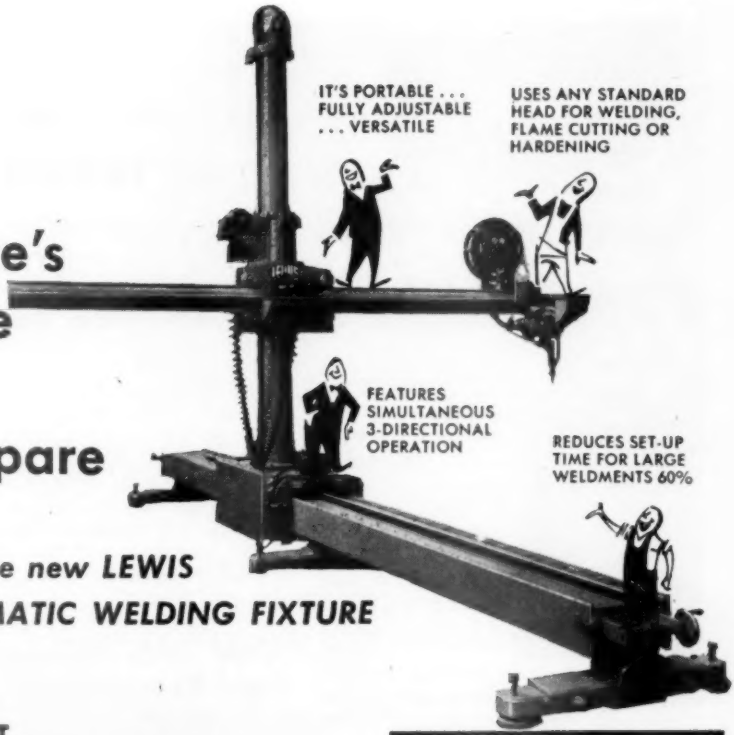
K-G Single Stage REGULATORS

Send for NEW 24-page CATALOG
Distributors: Write for franchise information.

The K-G Equipment Co. (Inc.)
Dept. B, 1744 Lehigh St., Allentown, Pa.

Circle No. 58 on Reader Service Card.

There's none to compare

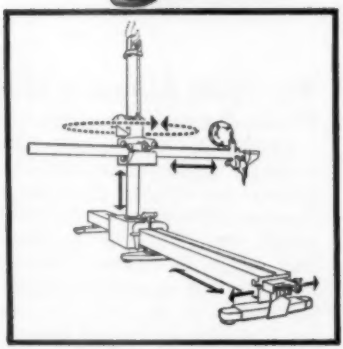

IT'S PORTABLE . . . FULLY ADJUSTABLE . . . VERSATILE
USES ANY STANDARD HEAD FOR WELDING, FLAME CUTTING OR HARDENING
FEATURES SIMULTANEOUS 3-DIRECTIONAL OPERATION
REDUCES SET-UP TIME FOR LARGE WELDMENTS 60%

with the new LEWIS AUTOMATIC WELDING FIXTURE

SEE IT AT . . . BOOTH 230-231

WELDING SHOW

MEMORIAL AUDITORIUM
Buffalo, N.Y., May 9-11, '56



6896-LWE *FOR DETAILS AND PRICES, WRITE TODAY . . . OR CALL BEDFORD 2-2500.*

LEWIS

THE LEWIS WELDING & ENGINEERING CORP.
WELDING DIVISION
70 Interstate Street • Bedford, Ohio

Circle No. 60 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Federal Machine and Welder Appoints Schultz

Harry L. Schultz has recently joined the Warco Press Sales Engineering Department of The Federal Machine and Welder Company. Mr. Schultz has been associated with the manufacture, design and application of presses for twenty years. Prior to coming to Federal, he was employed as Chief Engineer by the Cleveland Punch and Shear Works.

Bay State Abrasive Makes New Appointments

James A. Turnipseed, Jr., was recently appointed an abrasive engineer for North Carolina, South Carolina, Tennessee, Northern Alabama and Eastern Arkansas for Bay State Abrasive Products Co. Prior to this appointment Mr. Turnipseed was an abrasive engineer for Sterling Grinding Wheel Co.

Another recent announcement is that of the appointment of H. Gene Miller as an abrasive engineer for the state of Minnesota and a section of Wisconsin. Before joining Bay State, Mr. Miller was associated with Bossert Company as an abrasive specialist.

General Electric Appoints Henry Keep

Appointment of Henry Keep, Jr. as Manager of the General Electric Welding Department's newly established New Jersey sales office and service center, has been announced by E. K. How, manager of sales, Welding Department.

Keep has had wide sales experience in the welding industry and is a member of the American Welding Society.

Alloy Rods Appoints Field Representative

William Troy, Jr. of Baltimore, Maryland, has joined the sales staff of Alloy Rods Company as Field Representative. His territory will be Maryland and South Central Pennsylvania, and he will make his headquarters in Baltimore.

Elliot Glove Doubling Present Facilities

The latest news out is that the Elliot Glove Company, Inc., Oconto, Wisconsin, is in the process of constructing a new factory building. The new plant, modern in every detail, will utilize the latest processing equipment, and will more than double their present space. Company is a well-known manufacturer of gloves and safety clothing.

(More News on Page 46)

STAINLESS STEEL WELDING WIRE...

Spooled . . . layer wound to assure a smooth, even feed. Sizes: .035", .045", 1/16", 5/64" and 3/32" diameters.

Coiled . . . layer wound on rims for submerged arc welding. Sizes: 1/16", 5/64", 3/32", 1/8", 5/32", 3/16" and 1/4" diameters.

Cut Lengths . . . straightened and cut wire furnished in 36" lengths for inert arc and gas welding. Sizes: .035", .045", 1/16", 5/64", 3/32", 1/8", 5/32", 3/16" and 1/4" diameters.

Two factors give

Drawalloy

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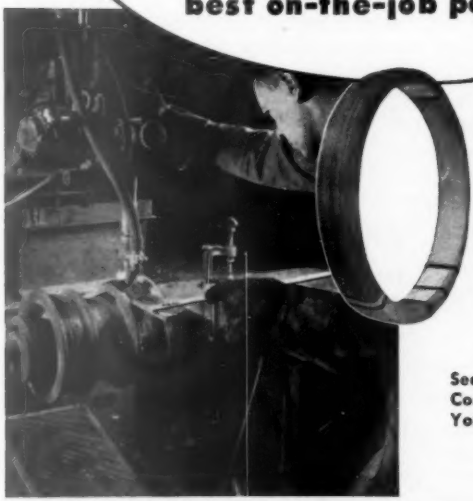
WELDING WIRE

best on-the-job performance



Drawalloy welding wire is a product of two factors—years of experience in the welding industry combined with the best wire mill drawing practices. The result is clean welding wire with the proper finish, temper, diameter tolerance and chemical analysis. It's a wire that produces the highest quality welds continuously—with an easy, sure feed and a constant, smooth arc.

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Coiled . . . precision drawn for perfect roundness to insure continuous, smooth feed with any automatic head. Available in six Types for hard-facing applications.

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The Wire Mill For The Welding Industry
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Wilbur Joins Progressive

William T. Wilbur has accepted a position as chief application engineer at Progressive Welder Sales Company, Pontiac, Mich. Mr. Wilbur brings to his new position an experience of over 16 years as an application engineer and designer in the resistance welding field. In his new position, he will be responsible for the design of all special application resistance welding equipment for Progressive's customers.

Air Reduction Promotes W. B. Brower

According to a recent announcement, W. B. Brower has been appointed assistant manager of the equipment sales department, Air Reduction Sales Company.

Brower has been with Air Reduction for some years, and will be responsible for the sales promotion of cutting machines and manual gas welding and cutting apparatus.

Tube Turns Announces Latest Appointments

L. J. (Lew) Morris has been appointed assistant district manager at Pittsburgh. Mr. Morris was process equipment buyer for the Fraser-Brace Engineering Company before joining one of Tube Turns' affiliated companies. He became a member of the Pittsburgh sales staff in 1949.

T. T. (Jock) Thompson has been added to Tube Turns' sales staff at Pittsburgh, concurrent with the appointment of Morris. He was a representative of the Watson-Stillman Fittings Division of H. K. Porter Company before becoming associated with Tube Turns.

Walter Palmer Fatally Injured; Traffic Accident

With the tragic death of Walter E. Palmer in a traffic accident on the Pulaski Skyway Drive in Jersey City recently, the welding industry has lost an active, diligent and popular friend. Mr. Palmer represented The Champion Rivet Company in their New York-New Jersey territory. He was a member of the American Welding Society for more than 20 years and was very active in the New York section. Prior to his connection with Champion he was associated with the All-State Welding Alloys Company, Inc., as sales manager.

Mr. Palmer is survived by his widow, his son and two daughters.

All-State Establish Additional Nationwide Stocks

A considerable factor in the growth of All-State Welding Alloys Co., Inc., is said to be traced to the strategic location of local stocks of alloys and fluxes so as to provide near-by convenience, bulk supplies and technical guidance for all users.

Following this long-term policy, Tom Nast, president of All-State, announced that the company has recently established additional stocking points in twelve States.

(More News on Page 137)

QUIET!

I can't hear the arc!

Good welders know a soft, quiet arc means that all the electrical energy is being spent pushing metal into a strong, sound seam. They know there will be less spatter loss, less cleaning time, lower welding cost per foot.

It is this quality of soft arc that distinguishes the Westinghouse XL-610 electrode. With it, welders get the kind of welds their *pride in workmanship* demands... production managers get the sound physicals and low cost their *product* demands.

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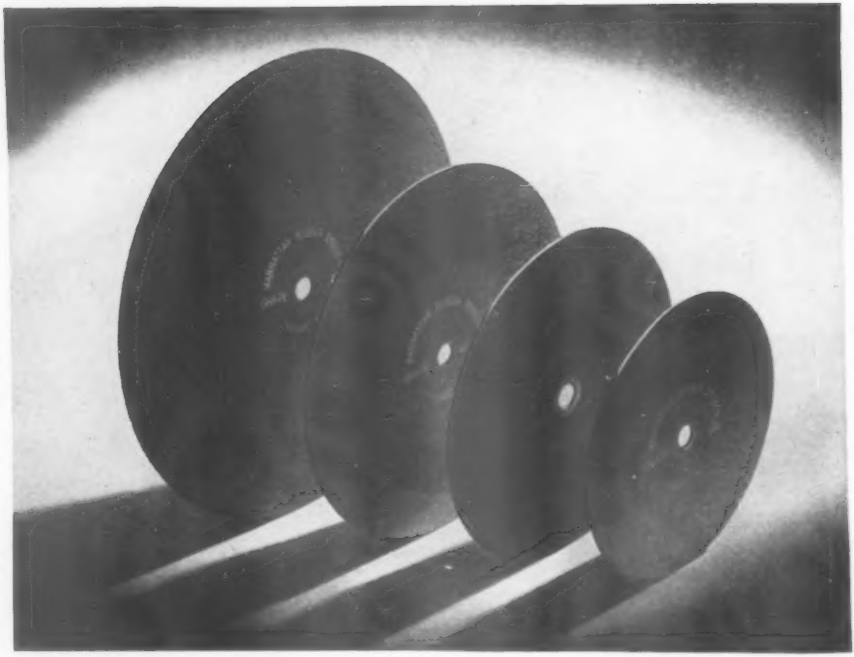

Cleaner Cutting...Longer Wheel Life with MANHATTAN CUT-OFF WHEELS

Every Manhattan Cut-Off Wheel is custom-bonded to cut cleaner at higher speeds on specific cut-off jobs . . . with hardened steel, soft steel, light gauge tubing or critical alloys. Factory records of the number of cuts per wheel have proved they do a better job . . . and *last longer* than any other wheels!

Manhattan Cut-Off Wheels are custom-manufactured for your specific requirements in the widest range of types and sizes. Let a Manhattan Abrasive Wheel engineer show you how you can save time and money . . . get "More Use per Dollar" . . . with Manhattan Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM-6308

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

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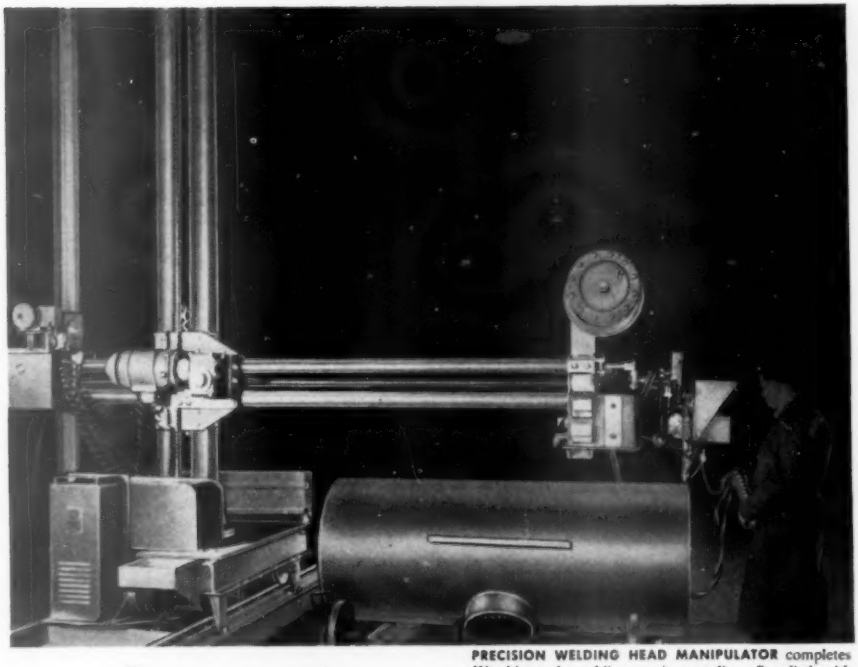

PRECISION WELDING HEAD MANIPULATOR completes Worthington's welding equipment line. Supplied with welding head and accessories of customer's choice.

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new automatic welding head manipulator

Only Worthingon now offers complete equipment line plus nationwide sales and service

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With the addition of this new, custom-manufactured precision-designed welding head manipulator to its line of welding positioners and turning rolls, Worthington now offers a complete packaged deal to automatic welding equipment users.

What's more, Worthington is the *only* manufacturer offering all the equipment you need—*plus a nationwide sales and service organization.* You get the equipment you need *when* you need it—and we're there to see that it works *after* you get it. Bring your positioning problems to Worthington for a quick solution.

Find out how the new Worthington packaged positioning equipment deal can help you. Write today for free literature to Worthington Corporation, Positioning Equipment Division, Section Y.6.1, Harrison, New Jersey. Y.6.1

WORTHINGTON

Drop in and see us at the Welding Show, Buffalo, May 7-11. Booth No. 223

Circle No. 81 on Reader Service Card.

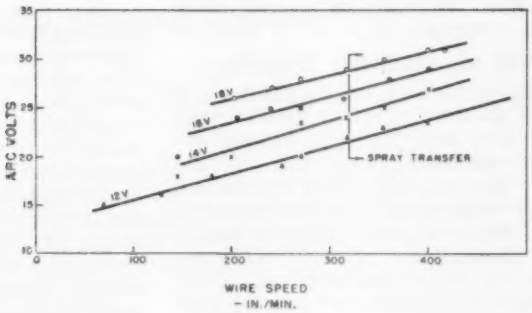
Will constant potential DC rectifier machines replace other power sources in consumable electrode inert arc welding of magnesium? What shielding gas (or combination of gases) produces the best welds?

These are questions answered in this discussion of new developments in semi-automatic . . .

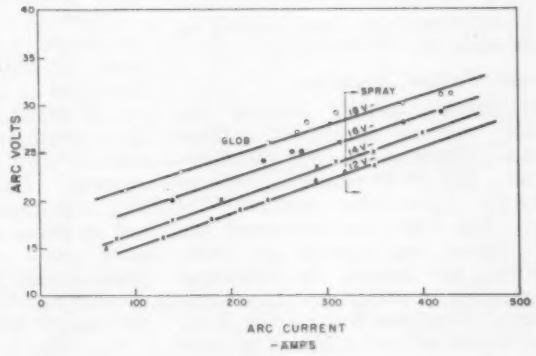
Consumable Electrode Inert Arc Welding of Magnesium *Part 1*

by PAUL KLAIN
Metallurgical Laboratories
The Dow Chemical Co.

DURING the past few years consumable electrode arc welding, using a continuously fed wire and a high current density arc with inert gas shields, has been notably successful in welding almost all metals except magnesium. Early attempts to adapt the process to magnesium were only partially successful because of unfavorable arc characteristics with the then available conventional power supplies. The recent development and introduction of constant potential power sources, especially designed for consumable electrode arcs, have resulted in greatly improved operating conditions. Under laboratory conditions, but not yet on a production basis, magnesium



FIGURES 1 and 2. Motor generator machine with rising slope was tested using .092-inch diameter wire in argon (tap "A" at fixed open circuit voltage). Results showed that increase in wire speed (top) or current (bottom) increased arc voltage, even though arc length was held constant.



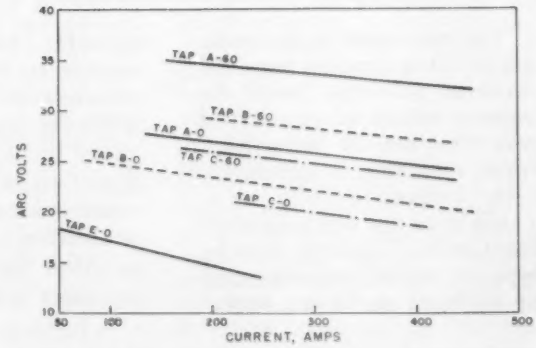


FIGURE 3. Constant potential DC rectifier machine tested using .092 wire in argon at different tap settings showed a slightly drooping volt-ampere characteristic. It appeared that arc length varied (decreased) with increased current at fixed open circuit voltage.

is now successfully welded with this process.

Spray vs. Globular Transfer

In early tests on magnesium, it was shown that spray metal transfer was possible with $\frac{1}{16}$ and $\frac{3}{32}$-inch diameter wires, but because of extremely high wire speeds and poor operating characteristics of conventional power sources, highly inconsistent and unpredictable operating conditions resulted. Consequently, slower wire speeds, with resultant globular metal transfer, were stressed for welding. Sound welds of high quality were thus obtained, but weld penetration was shallow and welding was confined to the flat position, thus limiting its usefulness on magnesium.

Three Power Sources

Essentially, power sources are direct current machines, either motor-generator or DC rectifier-types. For most metals, reverse polarity (electrode positive) is used. The variables concerned are wire speed, arc current, arc voltage and arc length. In operation wire speed is varied and this variation determines the correct current which will be supplied to melt wire at the rate supplied. This is accomplished at either a constant arc length or constant arc voltage. Current cannot be adjusted since it is determined only by the rate of wire feed and therefore some equipment has no current indicator. Since arc length or arc voltage is kept constant, current varies to compensate for any irregularities in the arc. Therefore, measurements of currents result in wide variations, making it difficult to obtain consistent values. Wire speed is frequently used as a measurable quantity, rather than welding current itself, because of its better consistency.

Test Different Power Sources

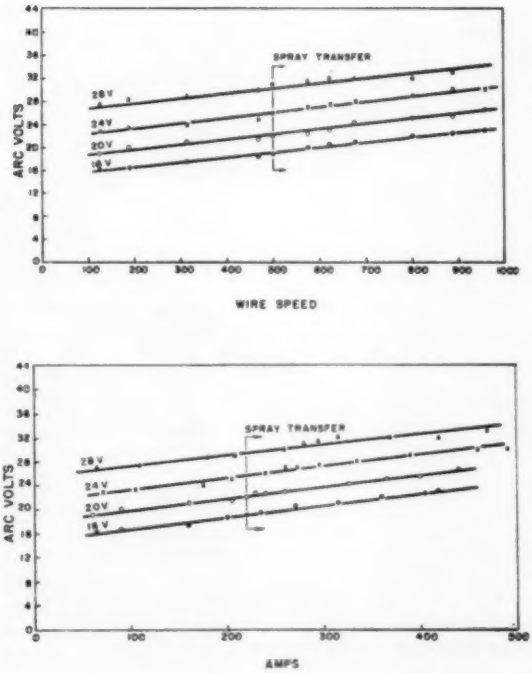
Characteristic curves of a motor-generator machine with a rising slope as obtained with .092-inch diameter J1 alloy wire in an argon shield are shown in Figures 1 and 2, in which arc voltage was plotted against wire speed and against arc current. The arc length, which was also represented by a certain arc voltage, was held fixed while wire speed was varied. As wire speed or current was increased, arc voltage also increased, even though arc length was held constant.

The significant feature of these curves was that both arc voltage

What Is Consumable Electrode Inert Arc Welding?

The consumable electrode arc welding process uses DC reversed polarity. Small diameter coiled wires are fed into the arc at very high rates, resulting in extremely high current density arcs. These arcs are distinguished from normal welding arcs by type of metal transfer and by stiffness of the arc. Metal transfer through the arc occurs in the form of fine droplets or spray. The arc stiffness causes the metal spray to be projected in the direction in which the electrode points. Because of this projection phenomenon, all-position welding is possible for most metals.

—motor generators showed up well" . . .



FIGURES 4 and 5. Motor generator power source with more nearly flat characteristics was tested with .064-inch diameter wire in argon gas. Curves were only slightly rising, indicated that a decreasing arc length, but to a much lesser degree than with rectifier machine, was obtained.

and wire speed or current increased or decreased together, even though arc length, as shown by open circuit voltage, was held constant. In effect, arc voltage and arc current could not be varied independently for a change in one resulted in a change of the other. Similar results were obtained with helium shields, except that curves for a given open circuit voltage were at a higher level. Also, scatter of points at about 250-300 amperes was more pronounced. Significance of the scatter in points at near spray transfer conditions was not known, but appeared to be related to the transition range from globular to spray transfer.

The constant potential DC rectifier machine tested showed a slightly drooping volt-ampere characteristic. Curves for the minimum (-0) and maximum (-60) open circuit voltage of a few taps are shown in Figure 3. There was considerable overlapping from tap to tap to allow for a variety of arc length adjustments. Curves were all of the same slope but different open circuit voltage. Drooping characteristics showed higher open circuit voltage than the rising characteristic machine. In the recti-

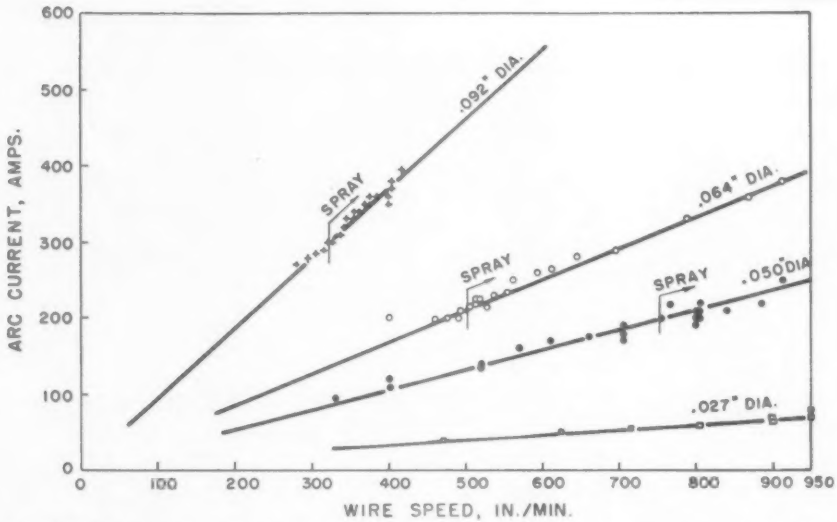


FIGURE 6. Melting or "burn-off" rates at 22-28 arc volts in argon gas indicates that wire melting rates are primarily a function of current and are independent of arc voltage as is the case with other metals.

fier machine, it appeared that arc length varied (decreased) with increasing current at a fixed open circuit voltage.

A third power source (motor generator) with more nearly flat characteristics was tested with results shown in Figures 8 and 9. Curves were only slightly rising, indicating that a decreasing arc length, but to a lesser degree than with the rectifier machine, was obtained.

Obtain Good, Sound Welds

Actually, very little difference in use of the three types of power sources was observed. Equally good, sound welds were obtained with all, although theoretically, the machine with a rising characteristic should perform better because constancy of arc length was of greater importance than of arc voltage in view of high wire speed rates. A disadvantage of the DC rectifier might be that power line variations would be reflected in its output. However, it has an advantage over the motor-generator set because it has no moving parts to wear out.

With regard to upper limits of welding with each wire size, it was observed that when maximum current or wire speed was attained, a very serious turbulence or agitation in the weld puddle occurred. The turbulence resulted in an unsound and rough-appearing weld. The upper limit for wire speed or current was dependent to some extent on arc voltage, the turbulence being more pronounced at lower voltages. Welding current range in the spray region for each wire was about 120 amperes.

From data developed, it appeared that conditions for .050-inch diameter wire represent the lower practical limit for spray transfer welding. This means that $\frac{3}{16}$-inch is the minimum thickness which can be welded, since the minimum current for this wire results in 200

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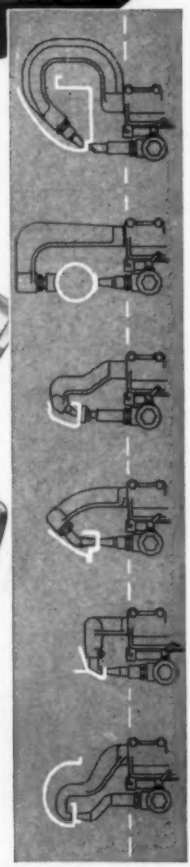

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amperes, which is too high for anything less than $\frac{3}{16}$-inch. However, thinner gages can be welded by the consumable electrode process but under somewhat different arc conditions which will be described later. The upper limit in thickness to be welded has not been determined, but since 420 amperes are possible with $\frac{1}{32}$-inch wire, this should prove adequate for the metal thicknesses now in commercial use.

Position Welding Was Limited

Position welding with spray metal transfer arc with steel somewhat limited because of the high wire melting or deposition rates. It was not possible to weld in any but the flat position with .064 and .093-inch diameter wires satisfactorily. However, with the .050-inch wire, vertical and horizontal position welding was readily accomplished. With the larger wires, the deposited metal could not solidify rapidly enough and tended to roll down.

Wire melting rates and spray transfer conditions in helium were not investigated extensively because of the considerably higher spray transfer current and because of excessive metal spatter.

A comparison with corresponding aluminum conditions obtained from published data, showed magnesium wire feeding rates were up to three times those of equivalent diameter aluminum wires, while the critical currents were only slightly higher. For the .064 and .093 wires, critical currents for magnesium were 220 and 300 amps. and for the corresponding aluminum wires, 175 and 250 amps., respectively. The large difference in melting rates between aluminum and magnesium wires in argon arcs were more readily apparent. The speed of J1 wire for a given current was from 2 to 2½ times that of the aluminum wire. No adequate explanation for the large difference in melting rates of aluminum and magnesium wires is possible at the present. However, it is evident, by comparison with aluminum, that limitations in position welding with magnesium are chiefly due to high metal deposition rates at the given currents.

Effects of Shielding Gases

As is well known in tungsten arc welding, some differences in arc characteristics may be expected in using helium compared to argon or their mixtures. Of primary concern is effect of the gases on melting rate of wires. Tests show that the melting rate in both gases for a given current is about the same. This appears to be contrary to known fact that a hotter arc is obtained with helium. However, this contradiction is easily resolved when volt-ampere data for a constant wire speed are examined.

Compare Argon and Helium

To show effect of argon and helium on arc characteristics, a series of weld beads were laid on a 0.450-inch plate at constant arc voltages of 22, 24, 26, 28 and 30 volts and at a constant wire speed of 645 ipm. It was interesting to note that under identical conditions, current for a given arc voltage was lower for helium and mixtures containing helium than for argon. Conversely, for the same arc current, voltages were higher. It was apparent that, at a given melting rate, the same value of current might be had

(Continued on Page 80)

Higher currents, shorter time and lighter pressures than used for mild steel are required when you are . . .

Resistance Welding Copper-Base Alloys

MOST copper base alloys have a higher electrical and thermal conductivity than mild steel. For this reason, weldability of these alloys depends on the proportion of alloy in them. Low brass and copper compositions, which have relatively high electrical and thermal conductivity, are difficult to fabricate by resistance welding. Alloys whose conductivity values are considerably lower, such as the nickel-silvers, cupro-nickels, the silicon and phosphor bronzes, are within the preferred welding classification.

Weldability Of Alloys

Comparative weldability is shown in Table I. In rating alloys, "A" indicates a weldability that is comparable to that of mild steel; "B", a weldability a little less than that of mild steel; "C" fair weldability, difficulties encountered decreasing as gauge decreasing. "D", "E" and "F" indicate even lower weldability. Those alloys classified "D" and "E55 cause considerable difficulty in resistance welding. Not practical for welding are those alloys listed as "F".

Importance Of Welding Equipment

Due to the need for employing high welding currents, equipment must have sufficient capacity so that satisfactory welds can be made in a minimum of time. Recommended time, current and pressure variables, shown in Table II, were established by trial.

The electrical and thermal conductivity of copper base alloys also dictates the type of electrode material used. Generally, the high conductivity materials require an electrode material with low conductivity and vice versa.

Pure Copper Is Hard To Weld

High conductivity of alloys with extremely high copper content, makes them difficult to spot, seam and projection weld. However, in the thinner gauges, pure coppers can be partially welded by the use of electrodes that have been faced with a high resistance material like tungsten or molybdenum. Tinning or copper helps.

Less Copper Means Better Welds

Brasses, which are chiefly composed of both copper and zinc, exhibit weldability which varies with alloy composition. Difficulties in welding again increase with the

(Continued on Page 60)

TABLE I—WELDABILITY OF THE COPPER BASE ALLOYS

Alloy Type	Electrical Conductivity	Thermal Conductivity	Resistance Welding Rating	Comments
Gilding metal	56.0	62.8	F	Both alloys considered commercially impractical to weld by resistance methods.
Commercial brass	44.0	47.7	F	
Red brass	38.0	42.2	E	These alloys are difficult to weld; require low electrode force and high energy input. 100% uniform results cannot be expected.
Rich low brass	35.0	39.0	E	
Low brass	33.0	36.8	E	
Cartridge brass	27.0	31.0	C	Difficult to weld. Difficulty of weld blowing through. Tip pick-up.
High brass	26.0	30.4	C	Difficult to weld. High energy input required. Forces should not be less than 400 lb. Thin gage welding sat.
Muntz metal	28.0	32.8	C	Thin gage welding satisfactory. Pressures 400 lb. or over required.
Silicon bronze, type A	7.0	8.0	A	Best of the Cu base alloys for resistance welding. Low energy input and avoidance of short time cycles. Little tendency toward electrode sticking.
type B	13.0	15.5	B	
type C	8.0	8.5	B	
Phosphor bronze, grade A	18.37	21.1	C	Grades C and D weld almost as easily as steel. Grade A is a little more difficult. Moderate good strength properties, but ductility is poor. Some tip pick-up.
grade C	13.0	16.2	B	
grade D	10.6	13.1	B	
Aluminum bronze, 5%	18.0	21.2	D	Difficulty experienced in resistance welding.
8%	15.0	16.2	D	
Nickel aluminum bronze type A	15.0	17.0	C	Fair welding characteristics; high values of current, timing and pressures. Welds have low ductility.
type B	13.0	14.9	C	
Nickel silver, 10%	8.27	11.9	B	These alloys resistance weld nearly as readily as steel.
15%	6.0	9.0	B	
18%	6.0	8.65	B	
25%	4.0	7.0	B	
Cupro nickels, 15%	8.0	12.0	B	These alloys resistance weld nearly as well as steel.
20%	6.0	8.65	B	
30%	4.6	7.60	B	
Beryllium copper	25.0	21.0	C	Difficulty can be experienced.

NOTE: Electrical conductivity is expressed as a percentage of the International Annealed Copper Standard: 1.724 microhms per cm^3 at 20 deg. Cent.
Thermal conductivity is given as a percentage of the conductivity of pure copper at 20 degrees Cent.: 0.923 C.G.S. units.

copper content of the alloy since copper increases conductivity.

Those brasses which have a fairly high conductivity, such as low brass, red brass or compositions containing over 80 percent copper, require low electrode pressures along with high energy inputs. In addition, there may be some electrode sticking. Resultant welds will then have comparatively low strength.

Cartridge brass, although having better weldability than the low brasses, contains enough copper to cause difficulties. Greatest problem is weld "blow-through" which accompanies long welding times,

SPOT WELDING CONDITIONS FOR COPPER ALLOYS; 0.036 INCHES IN THICKNESS

Alloy Type	Time, Cycles	Pressure, Lb.	Current, Amp.
Muntz metal	4	400	21,000
High brass	4	400	24,000
Cartridge brass	4	400	25,000
Low brass	6	400	24,000
Red brass	6	400	25,000
Manganese red brass	6	400	22,000
Aluminum brass	4	410	24,000
Silicon brass	6	510	22,000
Silicon bronze	6	400	16,500
Phosphor bronze	6	510	19,500
Nickel aluminum bronze (work hardening)	6	400	21,000
Nickel aluminum bronze (precipitation hardening)	4	510	21,000

NOTE: R.W.M.A. Class 1 electrodes, 3/16 inches in diameter tip, 30 degree approach is employed.

low welding pressures and high energy input.

In high brass, which has a copper content of 65 percent and lower conductivity than alloys previously mentioned, a considerable range of welding conditions are available. Electrode sticking is at a minimum unless long welding time and high energy output is used. Tip pressures of over 400 pounds are required to prevent arcing and subsequent blowholes.

The addition of manganese to a red brass composition results in a marked improvement in weldability. This alloy, which is composed of 84 percent copper, 15 percent zinc and 1 percent manganese, can be welded over a wide range of conditions, the only difficulty encountered being that of electrode pick-up, where the factors of time, pressure and current are increased. High weld strength values can be realized.

Muntz metal is relatively easy to weld in the light gauges. Due to the high zinc content within this alloy, electrode pressures of less than 400 pounds should be avoided.

Silicon And Phosphor Bronze

Both the silicon and phosphor bronze alloys have excellent weldability. In spot welding of the silicon bronzes, short timing, from 2 to 4 cycles, should be avoided since shrinkage voids may occur. Also, there is a little tendency for electrode sticking.

The phosphor bronzes, which are characteristically hot short, exhibit good weld strengths even though ductility is poor. There is also a tendency for the electrodes to stick and pick-up.

Aluminum bronze alloys have resistance welding characteristics very similar to those exhibited by the silicon bronzes. Electrode sticking, pick-up and spitting occurs when high pressures are employed.

The nickel silvers and cupro nickels can be welded without too much difficulty. High currents and

(Continued on Page 89)

How Tractor Operators **Save 50% on Parts Replacement Costs**

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The operator shown here is depositing AMSCO AW-79 . . . to build up cash savings for tractor operators.

By rebuilding and hardfacing with Amsco Automatic Welding, he is adding *double the service life* of the original part...at about *half the cost* of a replacement part.

The Amsco "550" Automatic Welder is specially designed for this heavy-duty service. And Amsco AW-79 Alloy Steel Electrodes provide high impact and abrasion resistance.

Both large contractors and repair shops can make the Amsco "550" pay for itself in short order. Ask your Amsco Distributor for full details on the "550" AutomaticWelder and the full line of Amsco Hardfacing Electrodes.

Distributed in Canada by Canadian Liquid Air Co., Ltd.

AMERICAN Brake Shoe COMPANY

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OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC

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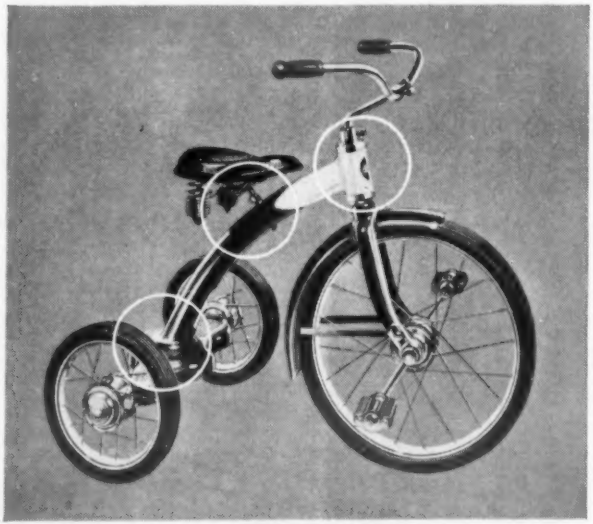
The sturdy Taylor Velocipede frame of 2-inch mild steel tubing is braze-welded on this fixture, with ⅛-inch Anaconda-997 (Low Fuming) Bronze Welding Rod, using the oxyacetylene flame-fluxing process.

Circle No. 9 on Reader Service Card.

's-inch Anaconda-997 (Low Fuming) Bronze Welding Rod, using the oxyacetylene flame-fluxing process.

"...quickest, most dependable, most economical..."

"Braze Welding with Anaconda 997 (Low Fuming) Bronze Welding Rod is the most practical method of joining steel tubing," The Frank F. Taylor Co.



The strategically placed braze welds on Taylor Velocipedes have smooth contours, a good basis for a fine finish—and high strength to stand up in the hardest service. The Frank F. Taylor Co. also makes the famous Taylor-Tot, standard equipment in most young families.

"By depositing smooth flowing and low fuming weld metal, Anaconda-997 (Low Fuming) Bronze Welding Rods promote faster, more uniform work—providing the quickest, most dependable, most economical method of joining steel tubing," says The Frank F. Taylor Company of Norwood, Ohio.

Anaconda 997 (Low Fuming) Bronze is a superior braze-welding rod widely used for the joining of steel, cast iron, and copper alloys by the oxyacetylene process. It is also used to deposit bearing surfaces on steel and iron. Anaconda Welding Rods are sold by distributors of welding equipment everywhere, such as O.K.I. Welding Company, Cincinnati, Ohio, which supplies The Frank F. Taylor Company.

See your Anaconda distributor for help in selecting the exact rod for your job. Or write for Publication B-13. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Company Ltd., New Toronto, Ont.

56108

ANACONDA® **WELDING RODS**

Circle No. 9 on Reader Service Card.

Operators are shown taking tests under Sec. IX, ASME Boiler Code. Large number who qualified recently greatly reduced number of retests required and effected substantial savings in cost of tests.

Proper Electrodes and Techniques

By FRANK IAPALUCCI
Chief Welding Engineer
Baldwin-Lima-Hamilton Corp.

IN a recent series of Performance Qualification tests at Baldwin-Lima-Hamilton Corporation, Eddystone Division, Philadelphia, Pa., 95.6% of 400 welding operators qualified on the first test. The few who failed the first time qualified on the second test. This Qualification Program was conducted under Section IX of the ASME Boiler and Pressure Vessel Code, 1953, using classification F-4 (low-hydrogen) electrodes, Specification SA-316.

Since an exceptionally large number of men qualified on the first test, the costs were approximately one third of those usually sustained in a series of performance qualification tests. In previous tests under the older ASME U-68 Code, using classification F-3 (E-6010 and E-6011) electrodes, Specification SA-233, the plant had normally qualified only about 40% of weldors on the first test.

The tests were conducted by Walter H. Shire, welding engineer, under the author's direction. Tests were given in the vertical, horizontal and overhead positions. The same design was used for all positions, a groove weld on a plate butt joint.

Welds were tested with two side bends as prescribed by Code regulations, and with radiography.

Results of tests in the three posi-

Walter H. Shire, Engineer, Baldwin-Lima-Hamilton Corporation, is shown conducting performance qualification tests in which 95.6% of the operators qualfied on the first test.

Improve Qualification Tests

tions were as follows:

In the vertical position (plate in a vertical plane with the axis of the weld vertical) 400 operators were tested; 372 or 93% of those tested, qualified on the first test.

In the horizontal position (plate in a vertical plane with the axis of the weld horizontal) 264 operators were tested; 260, or 98.5% of those tested, qualified on the first test.

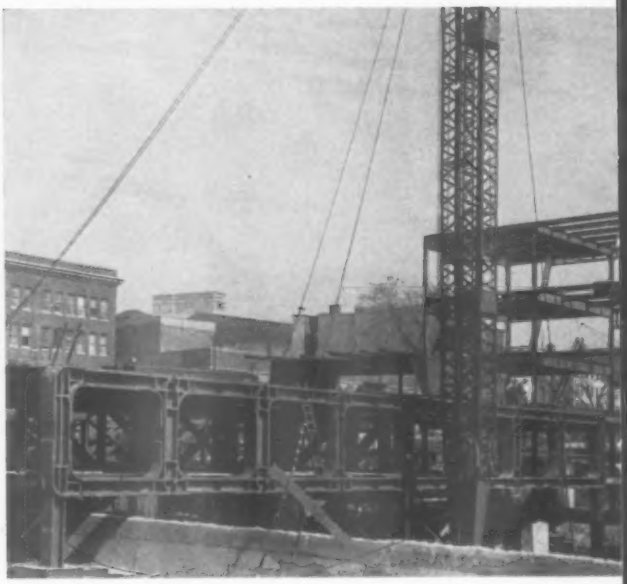
In the overhead position (plate in a horizontal plane with the weld metal deposited from underneath) 197 operators were tested; 191, or 97% of those tested, qualified on the first test.

Averaging the results in all positions, 95.6% of those attempting the tests qualified on the first test. In all positions, all those failing on the first test qualified on the second test.

The large percentage qualifying on the first test effected a very substantial saving in the cost of the tests, by reducing the number of retests required. The Code provides that operators who fail to meet requirements for one or more of the test specimens must receive further training or practice, or if immediately retested, must make two satisfactory test welds for each one that they have failed. For this reason, it is the retesting that frequently becomes the most expensive part of welding qualification tests. Many plans employing large numbers of operators figure that qualification tests cost them as high as $150.00 per test plate.

(Continued on Page 81)

Spanning 104-feet, weighing 94 tons and requiring 44 miles of deposited weld metal, these unusual trusses proved to be . . .



A Natural for Structural Welding

HISTORY was made in the fabrication and erection of steelwork for the new $2.7 million public library in Hartford, Conn.

All-Welded Building

Included in the framework of the all-welded structural steel building are five Vierendeel trusses, two of which are believed to be the largest and heaviest fabricated and erected for a building in the United States. They span 104-feet and weigh 94 tons. Two others have a 91-foot span and weigh 73 tons. The fifth one has a span of 91-feet, but weighs 53 tons.

This type of truss has been used frequently in Belgium, particularly for bridges. It is named for a Belgian professor, Arthur Vierendeel, who devised it in 1893 for the steeple of the church of Dadizeele in Flanders.

It was selected for the library because the panels provide open spaces—no diagonals—which will give more book storage space in the basement.

Natural For Welding

The project was a natural for fabrication and erection by welding. The five Vierendeel trusses alone required 44 miles of deposited weld metal (¼-inch equivalent) in the shop and field. These trusses were welded entirely from plates. It is interesting to note that the longest piece of plate was just over 8-feet long. The thickest plate used was 4⅜-inches by

Positioner eliminates out-of-position welding on Vierendeel corner knee section which weighs close to three tons.

Mild steel electrodes are used on most welded joints. For special application, low hydrogen-types are employed.

22-inches wide and 1-foot, 7⅞-inches long.

Largest welds were a butt weld 4⅜-inches thick in a plate 22-inches long and another 3⅞-inches thick in a plate 25-inches wide.

Fabrication was done in the Allentown, Pa., plant of Lehigh Structural Steel Co. Erection of steel was by LeHigh Construction Co., a subsidiary of LeHigh Structural.

Use Welding Positioners

Each knee or tee section is a subassembly. These were fabricated by a pair of operators who used welding positioners for comfortable, downhand welding. Trim was allowed at the end of all sec-

Oxy-acetylene flame cutting is a natural, too . . .

Two-torch flame cutting (top) makes double bevel on truss stiffener in single operation. Similar set-up with two pairs of torches cuts double bevels on both edges of web plates.

"J" welding groove is finished by flame cutting (bottom, left). Complete groove, (bottom, right) needs minimum of grinding for clean-up.

tions for milling to exact length.

Straight sections also were sub-assembled by a pair of welding operators. Then, a pair of operators welded one straight section to a pair of knees or tees to form each vertical of the truss into an assembly. Finally, to each vertical assembly was added the straight chord sections.

Final assembly was begun at the

(Continued on Page 71)

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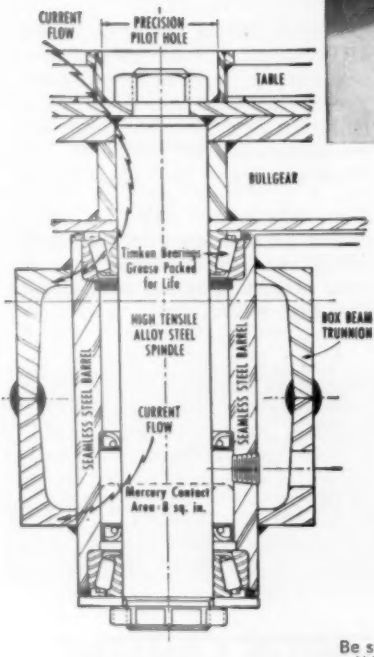
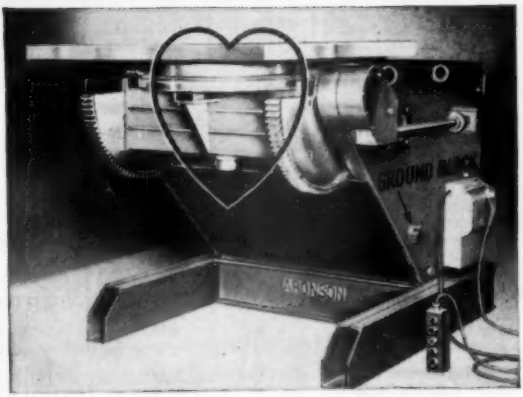
With ARONSON you get this
PLUS FEATURE
at NO Extra Charge:

2000 Amps. minimum Return Current SURE Conduction.





- **Not a gadget *extra* attachment.**
- **Nothing to wear out. Nothing to service.**

If your welds are erratic, chances are your ground circuit is at fault.

ARONSON has over 200 STANDARD Models in TEN different types of Welding Positioners to choose from. You can be *sure* ARONSON POSITIONING supplies what you need to make the best welds at the lowest cost.

Be sure to see the Aronson exhibit at the National Welding Show in Buffalo, N.Y.—May 9-10-11

another *Quality* POSITIONER by

Aronson MACHINE COMPANY
ARCADE, NEW YORK

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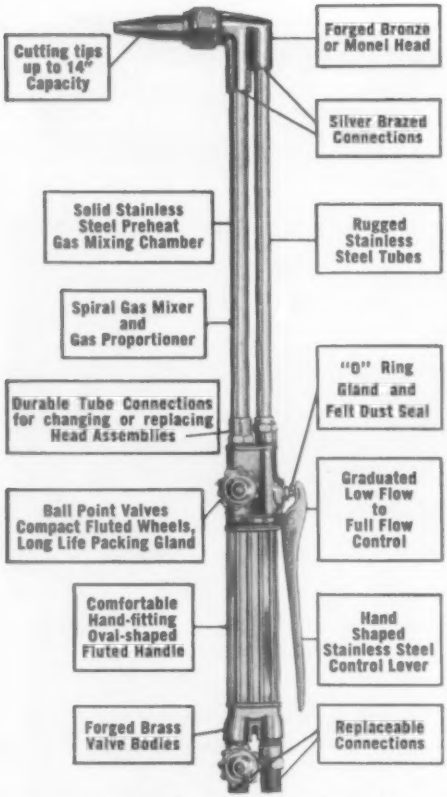
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Spiral Gas Mixer and Gas Proportioner
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Durable Tube Connections for changing or replacing Head Assemblies
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Ball Point Valves Compact Fluted Wheels, Long Life Packing Gland
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Replaceable Connections

Listed by Underwriters Laboratories, Inc.

VICTOR CUTTING TORCHES

Try this torch on your toughest cutting job . . . you'll find it keeps a cool head . . . time tested Victor spiral mixer and gas proportioner assures safe, economical operation.

Note clean lines . . . try its comfortable balance and hand-fitting handle . . . quality construction assures trouble-free performance and ease of repair and replacement of damaged parts.

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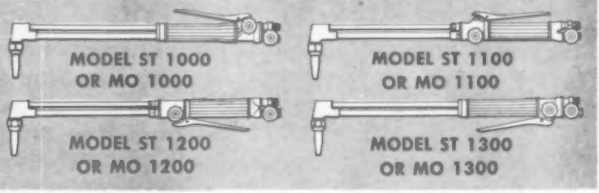
For maximum efficiency and safety use genuine VICTOR tips and parts.

FOUR LEVER POSITIONS



VICTOR for welding

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Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

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29

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end post and proceeded toward the mid-panel.

Use Various Welded Joints

In the straight, knee and tee sub-assemblies, single-Vee, double-Vee and fillet welds were used. The ends of knees and tees are squared milled ends. Webs of straights have a double-Vee and flanges of straights have a "J" groove.

Most welding was done with E60XX electrodes. For special applications E7016 low hydrogen-type electrodes were used.

The trusses were fabricated with steel splices so that each would come to the site in two sections. A temporary bent was erected astride the median strip (of the highway over which the library is built) to support the middle of the trusses. The two sections were then field welded on the temporary bent. Erection was done with a guyed derrick and a crawler crane. The derrick was then raised to the main floor level to erect the remainder of the center portion of steel. There were four field splices necessary for each Vierendeel, each consisting of a full strength field weld.

Welded Columns and Beams

In addition to the Vierendeel trusses, as well as columns and beams, this structure also required 10 conventional trusses. Five of these, composed of welded 14"-wide flange sections, have been placed at the first floor level. These were completely assembled in the shop.

The other five conventional trusses were required for the roof. From these, two floors of steel were supported on hangers. During erection the hangers were extended to the top of the Vierendeels, thereby converting the building hangers to temporary erection struts. These struts not only supported the floor steel, but also served as supports for the roof truss sections. After the truss splices were completed, the length of strut between the top of the Vierendeel and first suspended floor was removed, thereby converting the erection strut to the designed.

Some of these five roof trusses contain two field spliced. These were made in the erected position.

Gamma Ray Inspection

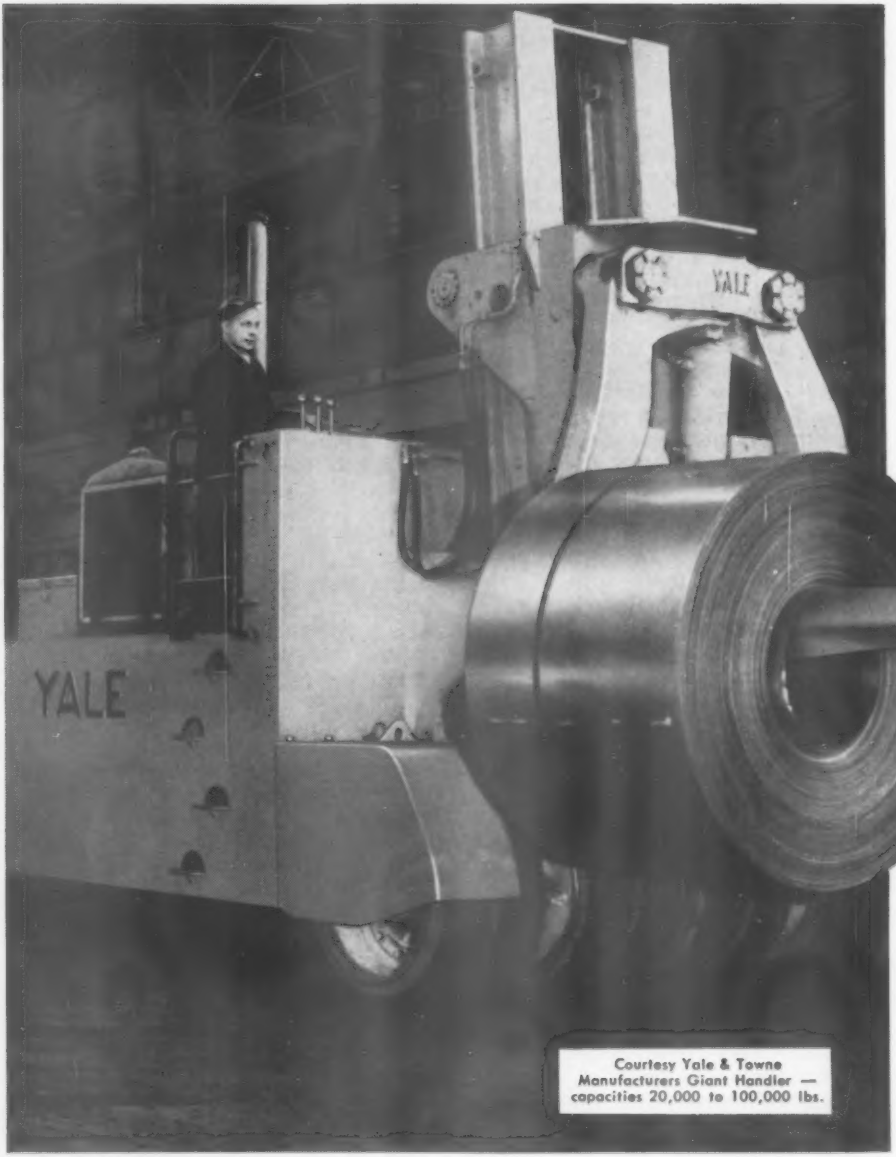
An interesting phase of this job was the inspection by gamma rays of a certain type of the many butt joints in the Vierendeel trusses. Under this process, a radioactive source is suspended on one side or over the joint to be inspected. A strip of film is placed on the opposite side of the joint. It takes about two hours of exposure for a 4-inch thickness of steel.

The fabrication of the Vierendeels was processed into sub-assemblies consisting of tees, knees and straight sections. These sub-assemblies were then assembled, either in the shop or in the field, by using butt welded joints. It was only this type of butt welds that were gamma-rayed.

The Vierendeels represent only a small portion of the total amount of steel in this all-welded structure, and gamma ray inspection of these particular butt joints was employed only because of the heavy material involved. None of the welding in all of the remaining, and major portion, of the steel was gamma-rayed. And this included the 10 conventional trusses which were as long as 104-feet and weighed up to 48 tons. On this

(Continued on Page 84)

THIS GIANT HAS



Courtesy Yale & Towne
Manufacturers Giant Handler —
capacities 20,000 to 100,000 lbs.

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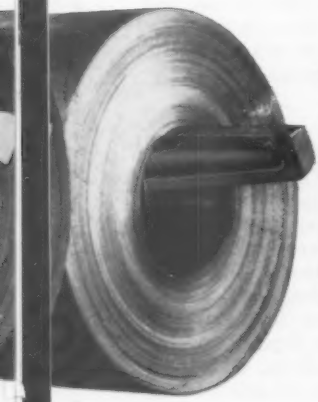
MUSCLES TO lift 100,000 lbs!

Here's the world's largest lift truck...the new Yale Giant Handler. Imagine the terrific forces welds must withstand when 100,000 pounds of steel are picked up. That's why important welds are made with A. O. Smith SW-44 and SW-65 electrodes.



QUALITY construction is the keynote of this big capacity industrial lift truck built by Yale Materials Handling Division of Yale & Towne Mfg. Co. Thus, in welding the box frame, the upright channels and the fork—this company uses uniform, high-quality A. O. Smith electrodes.

The SW-44 iron powder electrodes used on the frame deposit more E-6012 type metal than conventional rods—in less time—without popouts. And their self-peeling slag all but eliminates cleaning. The SW-65 (E-6016, — MIL 7016, low hydrogen) electrodes are outstanding for high carbon steels and for steel of poor weldability, such as high sulphur steels. Producing welds of exceptionally high ductility, SW-65's are used in construction of the uprights and forks.

If your products require welding — welding you can count on for speed, strength and appearance — it will pay you, too, to have the complete A. O. Smith story. Why not call in your "man from A. O. Smith" before you order any electrodes? A. O. Smith electrodes and machines save time, money and trouble.

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Because welding is our full-time business, we offer you America's finest welder-proved electrodes, machines and accessories.

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Dave Buerkel is the welding representative who worked with Yale in selecting electrodes to be used on this and other models. More than a salesman, he's a welding specialist, ready and fully-qualified to help with any welding problem.

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CORPORATION

WELDING PRODUCTS DIVISION

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Circle No. 89 on Reader Service Card.

Careful attention to joint fit-up and manual arc welding make it easy to get distortion-free welds in stainless steel dairy piping.

Permanent Welded Pipe Lines Can Cut Maintenance by 75 Percent

A REVOLUTIONARY departure in the dairy industry is proving a boon to welding contractors. Pioneered by the McHale Manufacturing Co., Los Angeles, a new shift to permanent welded lines in dairy process piping is producing better sanitation as well.

Pellissier Dairy—Pico, California, one of the first to use permanent welded lines, reports that permanent lines have decreased routine process pipe maintenance by 75%, meant greater sanitation, made the daily pipeline cleaning chore easier, faster.

The shift from removable process piping (thread and screw joints) in dairies began about five years ago. It was then that the first experiments in permanent lines were tried — mainly soldered joints. However, the soldered joints, while

Grinding starts on highest point of excess weld metal and finishes at lowest. This prevents grinding away of too much weld metal.

Flexible shaft grinder and a variety of grinding wheels, discs and mounted points are used. Actually, a minimum of equipment is required.

encouraging dairy engineers that permanent lines were both practical and sanitary, had drawbacks.

Soldered joints didn't measure up to the line's overall tensile strength —remained the line's weakest links. Then, about a year ago, some dairies pioneered still further, called in McHale, and together they worked out welding techniques which would assure great strength, yet sanitation. Today, Pellissier Dairy is tearing out its removal lines, putting in permanently welded ones.

Sanitation-wise (and this is most important from a dairy's point of view), permanent welded lines have already lowered the bacteria count per cc of finished milk product. Roughly, some dairies report that before permanent lines of any type (soldered or welded), the bacteria count averaged about 500 bacteria per cc. With soldered lines, the count dropped to 400 per cc. When welded lines were installed, the count dropped still more—to between 300-350 bacteria per cc. That's about as low as the dairy industry expects to come in the near future.

Responsible for this shift to permanent lines were old welding techniques, modified somewhat to fit the more exacting dairy standards. One problem with soldered joints, for example (a problem welding had to lick), was that no matter what solder was used—lead, tin, silver—and no matter how good the original job, voids almost always appeared. These voids, often formed in the interior joint, collected milk solids, were hard to clean, objectionable from the sani-

tary viewpoint. No amount of re-soldering seemed to correct this fault. Besides, soldered joints often broke, allowed leakage of the product.

Need for smooth, finished interior welds brought into action specially rigged grinders and polishers.

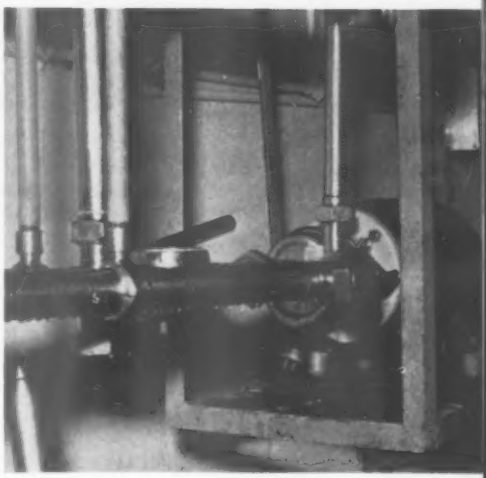
Pipe at the Pellissier installations were standardized to 2-inch, 16 gauge, and 1½-inch 18-gauge stainless steel. Best for these jobs is the 16-gauge, since it gives more area in which to butt-weld the joint. About 2/3rds of the stainless pipe was 2-inch, 16 gauge; the rest, the 1½-inch, 18-gauge.

How the Pipe is Cut

Pipe lengths are carefully measured to fit the installation. Then, pipe is placed in a vise or C-clamp fixture. The place to be cut is first grooved with a pipe-cutter, giving a 1/16 bevel. However, before the cutter has completely severed the pipe, it is removed, and the cut completed with a hack-saw. In some cases a fixture is used to guide the saw dead-center down the "V" bevel. This hack-sawing helps to enlarge the bottom of the "V". This means more room for weld metal, thus a stronger joint. When the correctly measured sections are cut, two are inserted in the vise, and tacked together in 6 to 8 places, making sure to weld on opposite sides to relieve distortion. Then the widened beveled "V" weld is completed. A 1/16 stainless steel welding rod is used.

Choice of Process

In some earlier cases, the stainless steel was oxy-acetylene welded, but McHale recommends electric welding, inert-arc or similar. This seems to give less distortion to the stainless. If oxy-acetylene is used, the mixture is 7 to 10 lbs. of acetylene to 5 lbs. oxygen; with a No. 1 or No. 0 tip, flame adjusted to a slight feather.



Removable connection (above) completes closed circuit so pipes may be cleaned. Except for these connections entire line is permanently welded.

Permanent installation is shown (below).

Grinding and Polishing

Once the welding is finished, grinding and polishing is begun. Most successful method for grinding

When an electrode like Fleetweld 5

Has soft arc action

Yet has equal penetration

WHY use anything but FLEETWELD 5-P for general purpose welding

FLEETWELD 5-P

- for structural welding
- for code work in shipyards
- for pipe welding...vertical up or vertical down

gives these cost-cutting advantages:

- uniform, deep penetration
- flat shaped bead
- easy slag control to cut surface holes
- steady arc action
- X-Ray quality

Specifications and Procedures in Weldirectory SB-1351.

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"Leave us look in the book"

If Pete has pulled that on me once, he's pulled it a hundred times. When we're arguing about *my* Mickey Mantle or *his* Duke Snider, *my* Yogi or *his* Campy.

Well, Pete has his book on baseball—but when it comes to welding cast irons, I have mine. Brand-new. It's called "A Handy Guide to Welding Cast Irons." And I pulled it on Pete a couple of weeks ago.

It all began with a blowhole

I was at the foundry welding shop where he works when an iron pump casing was brought in. It had a blowhole on the intake flange—and the boys wondered if Pete could save the casting.

Pete's a smart weldor, and he did the job easy — with Ni-Rod* electrodes. First, he chipped out the defective area. Then he started welding. Five passes—and the casting looked as good as new.

Stopped cold so he gets hot

A few minutes later I see Pete arguing with a feller from the machine shop. This feller has drilled one bolt hole in the casting.

But when he tried to drill another *right next* to the weld, he was stopped cold. The drill started skipping—wouldn't go into the casting.

Pete's look tips me off to his first question before he tosses it. "Hey, Nick," he asks, "how come the casting's harder at this spot?"

"Well—like you always say—leave us look in the book." I open my book to the section on machinability, and hand it to him.

He seems to read fast, because pretty soon he looks up and says, "O.K., I let the casting cool off too fast and so I got a hard zone next to the weld. I guess that means the whole casting has to go into the furnace."

Gets bead on annealing bead technique

"You didn't read far enough," I says. If you read the whole page, you'd know about the 'annealing bead technique' for softening the area next to a weld."

Then I pick up his electrode holder and lay an *extra* bead with Ni-Rod electrodes on top of the completed weld. And I'm careful not to get any of the hot weld metal on the cast iron.

"That's a *fast* way to heat-treat a hard spot," I tell him. "Keep the booklet. Pretty soon you'll know as much about welding as you do about baseball."

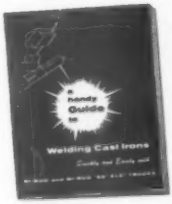
Circle No. 54 on Reader Service Card.

Well, after the casting has cooled, the second hole was drilled with no trouble at all. But I guess my last remark got him sore. His *next* question was a real fast one.

"Talking about baseball, Nick, do you know who won the 1904 World Series?"

I head out of that shop before he can ask me another. "You won't find the answer to that one in any book," I shout back at him. "That was the year they didn't play a World Series."

Send for this booklet



If *you* want to know the score on welding cast irons, write for "A Handy Guide to Welding Cast Irons." The "annealing bead technique" is just one of the *many* tips that this new, illustrated booklet gives you. It tells about preparation, welding technique, getting better machinability, welding heavy sections—*and lots more.*

And if you're around Buffalo, N.Y., May 9th to 11th, drop in and see me at the Welding Show. Booths 113-115. I'll be glad to chat over your welding problems.

*Registered trademark

Yours for better welds,

Nick Rodder

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N.Y.

Circle No. 54 on Reader Service Card.

WELDED PIPE LINES

(Continued from Page 76)

the interior weld has been use of a cylindrical grinding head, which has three spring-loaded leaves, holding three hones of aluminum oxide abrasive. This spring-loaded device holds the abrasive against the pipe wall and weld metal, allows smooth removal of the extra weld metal, and any voids along with it. The head is mounted either on a flexible shaft or on a few lengths of pipe, and is powered by a ¾-h.p. step-pulling-drive motor, at 4500 rpm. High speeds seem to do a better job on the pipe's interior. This rough grinding job, using No. 80 grit, is either a one man or two man job.

Grinding Techniques

If the pipe is long, then two men are needed — one to operate the grinder, the other to guide him. If short, one man can handle it easily. After rough grinding, polishing is done, usually with No. 120 grit. In the grinding process it is well to remember that grinding must begin with the highest point on the excess weld metal, and to grind down to the lowest. Otherwise, too much material may be ground away, weakening the joint.

Some dairies advise that wherever possible, Ls and Ts should be welded in as joints and junctures, and not crosses, which are harder to clean.

The line is permanently welded except for short-runs of pipe which connect the permanent lines to various fixed-positioned dairy machines. These short lengths where ever possible are Ls. And these are removed during daily, post-operational cleaning. The permanent line is then hooked into a complete circuit, using flexible, 3-ply, synthetic rubber hoses, or a U-shaped, gasketed, stainless steel connector.

WELDING MAGNESIUM

(Continued from Page 57)

for helium as for argon and consequently, the contradiction of identical melting rates in both gases was satisfactorily explained, since arc voltage was neglected in plotting the values. Helium arcs, as previously indicated, resulted in a large amount of spatter and were not considered practical.

The effects of various gases and different arc voltages on penetration characteristics of consumable electrode arcs are illustrated in cross-sections of welds. The argon beads had the shallowest penetration, which increased with increasing helium content. The presence of helium in argon also resulted in a rounding of the lower contour of the bead and tended to get away from the sharp pointed appearance of argon beads. In multi-pass welding, rounded bottom would be more desirable and from that standpoint helium-argon mixtures for shielding seemed to be more desirable than argon.

The effects of arc voltages were also readily apparent in photographs of cross-sections. Low arc voltages, especially at 22 volts, resulted in narrow beads and piled up metal on top. Higher arc voltages resulted in wider bead and deeper penetration. This was partly due to increasing currents. Excessively high arc voltages reversed the trend, resulting in shallower penetration. This was readily apparent in the 30-volt arc sections. The shallower penetration resulted from greater heat dissipation at longer arc lengths on higher arc voltages.

Since helium-argon gas mixtures

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(A development of the toroidal coil)

(Fully protected by patent applications)

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Portable BREN/WELD does the work of conventional welders 4 to 5 times its size and weight. Eliminates the need to transport bulky equipment or heavy parts.

BREN/WELD handles electrodes from 3/32" through 5/32", has adjustable arc voltage for various arc characteristics.

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appeared to offer more desirable bead shape and deeper penetration, it was necessary to determine whether the critical spray transfer conditions would be affected. The results of tests on .064-inch diameter J1 wire indicated that a progressive increase in the critical wire speed and arc current resulted with increasing helium content in the mixture. Therefore, in using gas mixtures with spray transfer arcs, the changes in the critical wire speeds must be taken into consideration.

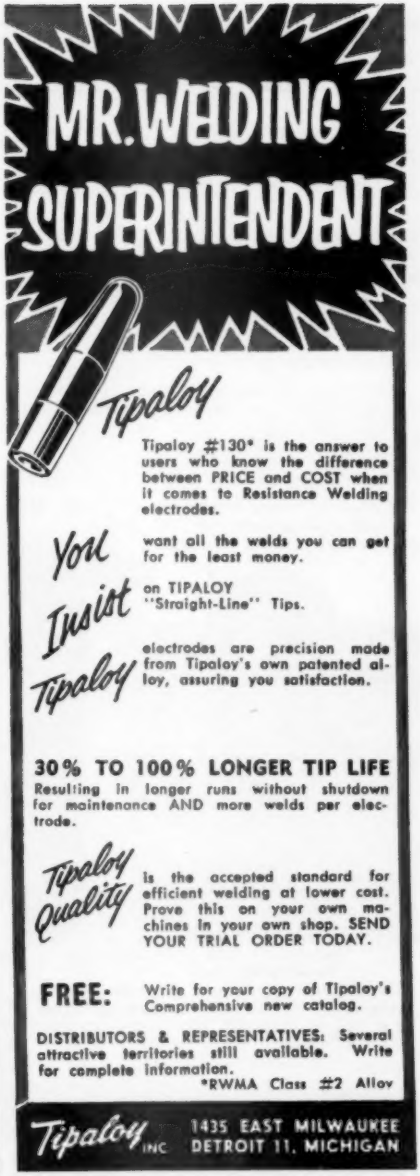
OPERATOR QUALIFICATION

(Continued from Page 65)

Qualification on plate also qualifies for pipe welding. Qualification in any of the three positions used in the tests—horizontal, vertical or overhead—also qualifies for the flat position. The groove weld qualification also qualifies for fillet welds; and qualification with Class F-4 electrodes also qualifies the operator to use F-1, F-2 and F-3 Classification electrodes.

Since the same design was used in the recent tests as in former series, and since the positions tested and other conditions of the tests were comparable, Mr. Shire feels that the success of the latest tests must be attributed in large part to the quality of electrodes used.

AWS Electrode Classification E-7016, Low Hydrogen, was selected as the electrode to be used in qualification work. This selection according to data provided by Metal & Thermit Corp., was based on the operating characteristics of very low spatter, quiet and steady, easily controlled arc, and smooth uniform deposits with a minimum of effort by operators.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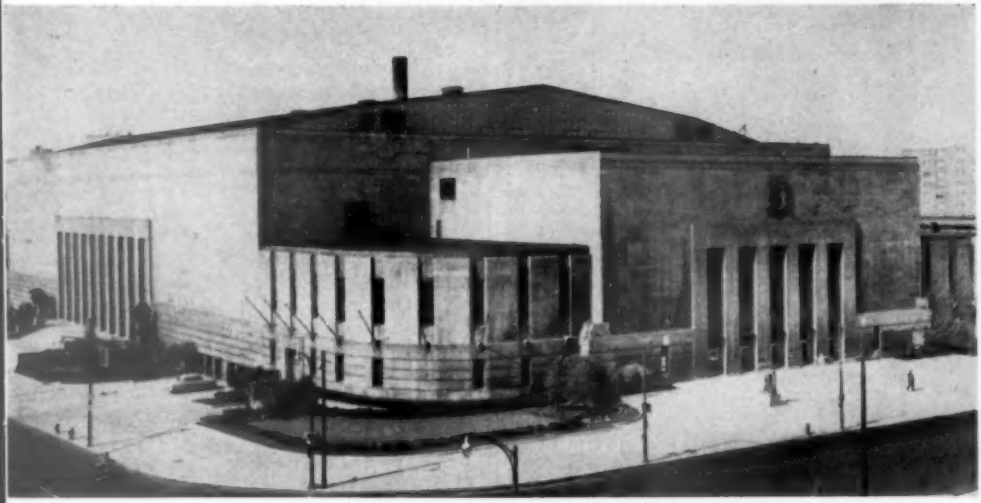


Buffalo's Memorial Auditorium is the site for the Fourth Annual AWS-sponsored Spring Welding Meeting and Allied Industry Exposition, May 7-11.

Welding Industry Holds Biggest Show

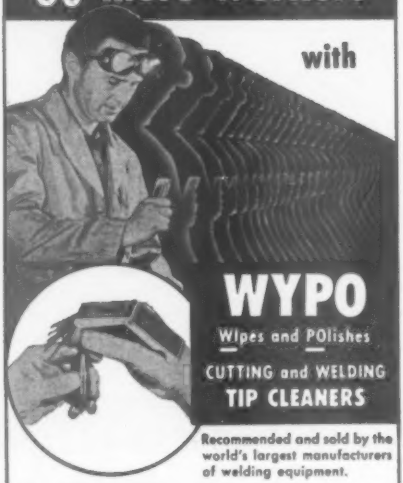
EXPECTED to be the most elaborate technical sessions and exhibitions in the field of welding engineering, the fourth Welding Show will be held in Buffalo during the week of May 7. A highlight will be the American Welding Society's annual Spring meeting, when the A. W. S. will join hands with several other organizations in the metals field including the Metals Engineering Division of the American Society of Mechanical Engineers and the Welding Committee of the Atomic Energy Commission.

One hundred and eleven engineers and technicians will contribute 65 papers to be read at 21 sessions. A non-technical conference on welding under direction of Lew Gilbert, exec. editor of INDUSTRY & WELDING, will be held for the benefit of production executives. This conference is designed to meet the needs of those interested in the practical aspects of welding in factories, but who are not required to keep abreast of laboratory research.

Another feature will be sessions devoted to safety, health and fire prevention by the Welding Society's Technical Activities Committee. An educational lecture series for engineering students also is planned.

The welding show itself is expected to break previous records for the number of exhibiting companies and the size of the displays. All exhibit space is already spoken for. There will be more live demonstrations of welding processes than ever has been conducted under one roof before.

60 more workers



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STRUCTURAL WELDING

(Continued from Page 71)

larger portion of steel in this job, as well as on all conventional welded jobs, the added expense of gamma ray inspection is not warranted.

In the first 50 joint sinspected by gamma ray, only a small part of one joint showed defects. This was cut out, rewelded and again inspected.

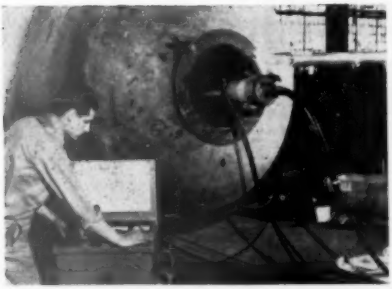
In the shop, welding was carried on over two shifts daily. Gamma ray inspection was carried on during the off-shift when no workers were in the area. A similar procedure was followed in the field.

Successful Welderama, Industrial Exhibit

The Kacena Company, Cedar Rapids, Iowa, has just held a most successful showing of welding, brazing and cutting equipment and processes. Called a "Welderama and Industrial Exhibit," it drew large crowds of people throughout the two-day show. Technical and production officials and industrial executives had a good opportunity to see first hand the latest and most modern methods of welding, brazing and cutting, and to examine the latest equipment. Representatives of more than twenty manufacturers were on hand to demonstrate the equipment and answer questions. The displays caused considerable favorable comment. Not only were they pleasing to the eye, they were effectively equipped and staffed. Many featured actual working equipment.

Refreshments were provided for the guests, and door prizes were awarded.

The event was timed to coincide with the 30th anniversary of the founding of this well-known welding supply company.



X-Ray Unit Checks Welds

In fabricating pressure vessels, vulcanizers, pipe lines and storage tanks for use by government and industry, Biggs Boiler Works, Akron, Ohio, checks the soundness of welds quickly and accurately with a powerful X-ray unit. A large rubber-lined storage tank with ⅜-inch steel walls is checked with the rod-anode X-ray tube mounted in the tank opening and the film wrapped around the exterior at the seam (above). Here, X-ray tube distributes rays over the 360° circumference.

In another operation on same tank, tube is mounted close to a section of the seam on the exterior. In this case, film is on the inside of the tank and a cap on the tube limits the rays to a small seam section under inspection.

Photo courtesy Research & Control Instruments Division, North American Philips Co., Inc.

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WELDING SHOW

MEMORIAL AUDITORIUM
Buffalo, N. Y., May 9-11, '56

AIRCO

WELDING and BRAZING Hints

PROBLEM: Brazing and Braze Welding Rod Selection

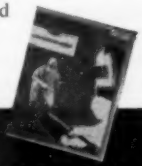
SOLUTION:

Airco #22 Manganese Bronze Rod. A general purpose rod that should be in every welding shop where high strength brazed joints are required. Flows smoothly and produces sound joints on maintenance work when used with either Airco Marvel Flux or Airco Hi-Test Liquid Flux. Airco #22 is also available with flux already coated on the rod to insure positive base metal protection.

Airco #20 Bronze Rod. Ideal for braze welding of steel, cast iron, malleable iron, copper, and dissimilar combinations of these metals. Airco #20 is available as a precoated rod using Hi-Test Flux. When this rod is purchased bare, either Hi-Test or Marvel Flux can be used for high strength welded joints.

Airco #27 Low Fuming Bronze Rod. For the brazing or braze welding of steel, cast iron, or bronze. Low fuming characteristics of this rod increase its applications in restricted areas. Recommended fluxes for use with Airco #27 are Airco Hi-Test or Marvel Flux. Flux coated rods also available.

Request Catalog 9-131W



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New Aluminum Alloy

. . . cost of fabricating

All-welded flatbed truck trailer made from new aluminum alloy has more than 3,000 pounds increased payload.

A RADICALLY new, all-welded aluminum flatbed truck trailer with a more than 3,000-pound increased maximum payload has been developed and is in service. The 35-foot trailer was designed by Kaiser Aluminum and Chemical Corp., which owns the patent rights, and produced in a joint development program by Beal Pipe and Tank Corp., Portland, Ore., currently fabricating production models.

The prototype — total weight 7,986 pounds and payload 45,000 pounds—has been in continuous service since January 1, 1955, without a structural failure.

The welded design of the prototype and almost identical production models is made possible by a new aluminum alloy—developed to compete with mild steel in fabrication and welding costs.

Used for all aluminum components of the trailer, the alloy is a non-heat treatable, high-magnesium-type with good weldability using consumable electrode inert arc welding and proper aluminum alloy filler wire.

Proper welding sequence was important and welding was done generally toward points of restraint.

In creating the design, Kaiser engineers adopted a radical departure from conventional steel trailer construction. An aluminum floor plate—3-feet wide and ½-

for Inert Arc Welding

aluminum trailer is competitive with steel

Minimum of production equipment, including welding units, press brake and power shear were required.

Because welds are smooth and free of spatter, minimum of cleaning is required with consumable electrode process.

inch thick—extends the full length in the center of the trailer to serve as an integral part of the frame.

This floor plate, outer floor plates, outrigger components, mounting pads, flanges and cross-members — all aluminum — are welded to two main beam webs, 36-inches apart—running the full length of the trailer.

Exceptional strength and stiffness in the critical area at the forward transition section, where beam webs decrease in depth, is obtained by double web, box girder construction.

High degree of structural strength and stiffness was proven by tests on the prototype. A maximum payload of 45,000 pounds was concentrated over the center 15-feet of the trailer. Maximum deflection was ¾-inch compared to as much as two inches or more for some steel flatbeds.

(Aluminum has a lower modulus of elasticity—one-third that of steel. An aluminum beam will deflect three times more than an identical steel beam under the same load. Due to design configuration of the prototype, deflection is much less than a steel flatbed.)

Design was made as simple as possible so trailers could be fabricated with a minimum of production equipment, including a press brake and power shear and con-

sumable electrode inert arc welding equipment.

A total of 3,120 pounds of aluminum was used and was mill cut specifically for the trailer to keep scrap loss at a minimum.

Trailer was built upside down without use of a jig by clamping center floor plate to a flat surface and tack welding other components in place. No distortion was experienced.

Main beam webs were ⅜-inch thick with depth varying from 9-inches at the front and 27-inches under the center section of the trailer.

Lower beam flanges, extruded aluminum strap 4-inches wide by ¾-inch thick, were bent by press brake to follow the shape of the forward and rear transition sections.

Triangular shaped outriggers were fabricated by shearing ¼-inch thick rectangular plate and forming the flange on one side by bending 90° with a press brake. Two outrigger blanks were thus cut from one piece of plate.

There were a total of 34 outriggers $\frac{3}{16}$-inch thick and 10½-inches deep where they joined beam webs. Twelve other outriggers were of ¼-inch thickness by the full beam web depth.

Forming of the flanges for the intermediate, front and rear crossmembers, used to separate the main beam webs, was all done on a press brake.

Aluminum vs. Steel

Experience during the prototype production and subsequent preproduction model runs shows that welding by consumable electrode process can be done at the same speed and cost using the special

KILL moisture absorption with DESPATCH ROD DRYING OVENS

It's an accepted fact that certain electrodes in storage tend to gather moisture and CO2. This applies to low-hydrogen, stainless steel and non-ferrous electrodes. The amount of moisture is related not only to the percent of relative humidity, but also to the length of time that electrodes are stored. Despatch "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications*: Outside dimensions—18"x19"x18". Max. Temp. 550° F; 250 lbs. rod capacity. *Write for Bulletin.*

★ For all types of baking, drying and ageing
★ Operator works steadily—rework time cut
★ Automatically controlled—set it and forget it
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aluminum alloy instead of steel. Total fabrication time per unit should be the same as or less than for steel.

Light cranes were used only for material handling. Due to the light weight of the components, much of the material handling was manual.

There was no preheating or post-heating necessary. Quality control is obtained satisfactorily by visual inspection. No weld cleaning is necessary because no flux is involved, nor is there any problem with fume exhaust or splatter.

RESISTANCE WELDING COPPER

(Continued from Page 60)

short time intervals should be employed to prevent severe indentation.

In resistance welding of the copper based alloys, the data given in Table II will be of help. Whether seam, projection or spot welding procedures are employed, higher currents, shorter time and lighter pressures than that used for mild steel are required.

Gold Sheets Welded into Nuclear Vessel

Ten sheets of gold ranging in size from 3 in. to 12 in. in width and going to more than 4 ft. in length, and varying from 10 to 15 thousandths of an inch in thickness, will be welded by Nooter Corporation, St. Louis steel and alloy fabricator to form a vessel for the Atomic Energy Commission.

The sheets of gold, weighing approximately twenty-five pounds, are valued at more than $14,000. They were ordered from Handy and Harman, a manufacturer of brazing materials and refiner of precious metals.

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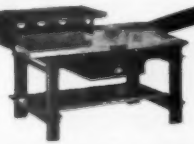

CHALLENGE also manufactures a complete line of auxiliary welding equipment including Cast-Iron Work Benches, (shown), Semi-Steel or Clovis-Black Granite Surface Plates, Checking Tables, Bench Plates and Adjustable Floor Plates.

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Circle No. 66 on Reader Service Card.

Induction brazing is an effective way of getting a lot of heat into a small area. By confining this heat to joint area, distortion and warping can be eliminated.

Could You Use Induction Brazing?

ALTHOUGH it is their specialty, induction heating is not necessarily regarded as the sole answer to soldering and brazing problems by officials of Cook Induction Heating Company at Maywood, Calif. In fact, they frankly admit that other types of heating, for limited production runs on many of their soldering or brazing jobs, are just as good.

However, they do maintain that properly employed, induction heating is one of the most important production methods yet developed.

Induction heating consists briefly of energizing an induction coil with high-frequency current so as to elevate the temperature of a metal object within the coil with magnetic lines of force. And, according to Cook officials, it's an extremely effective way of getting a lot of heat into a small area in a hurry. For example:

(a) Where overall furnace heating would cause brazed parts to be warped or distorted, induction heating can eliminate distortion by confining elevated temperatures to those joint areas which must be fused.

(b) Where generalized heating would alter the properties of annealed or tempered materials, induction heating can limit brazing or soldering temperatures to such a point that no supplemental heat processing will be required.

On the other hand, induction heating often necessitates the use of relatively expensive equipment and, sometimes, special accessories—usually special induction coils. Cook specialists have devised over

Silver brazing is still the old stand-by . . . .

a thousand different induction coils during the past ten years.

That doesn't necessarily make induction heating a costly production process. On the contrary, its ability to save time alone makes it the most economical production process for many applications. However, its practicability in connection with limited production runs is generally restricted to applications where gas torch heating would not give satisfactory results.

For example, in salvaging high-speed lathe tools by brazing extra materials to their shanks, induction heating has been practical on a limited production basis; but, if it hadn't been necessary to preserve the temper of the tools' cutting surfaces by localizing elevated temperatures, gas torch heating might have been equally practical and less expensive.

Ideal for Automation

Where long production runs are indicated, induction equipment has the twofold advantage of being able to produce a specified temperature with optimum speed, and of being adaptable to the use of fully-automatic handling accessories. Where a conveyor-fed loading fixture has been employed to load and unload an induction coil, *small gears and shafts have been brazed at the rate of one component every ten seconds.*

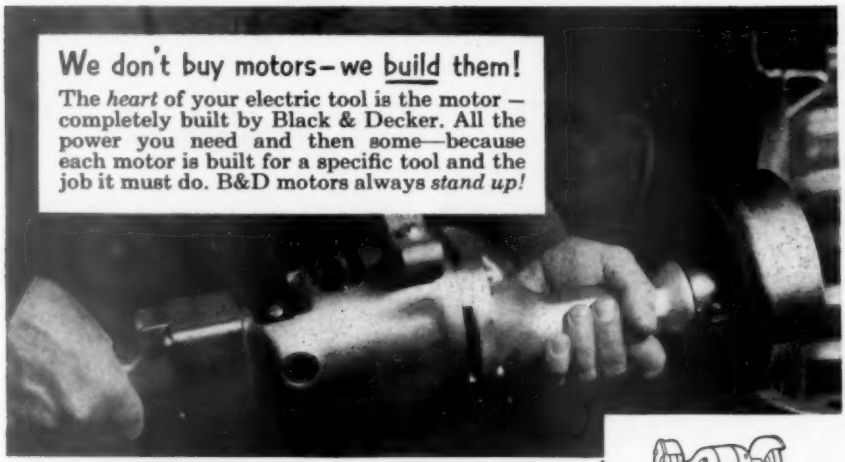
No Limits on Part Size

There are no actual limits to dimensions of parts or parts areas that can be heated with induction coils, but there are limits to the amount of power that can be generated with the induction equipment that is available in any given plant. Therefore, where it has been necessary to heat very large parts (or a large number of small parts in a single operation), conventional furnace facilities have been used to great advantage.

Cook Induction Heating Company is a ten-year-old firm with a 4000-sq. ft. plant which serves the western aircraft, oil tool, appliance, plumbing, and screw machine industries. Its brazing and soldering operations currently involve the use of three induction generators, two rotary tables (for continuous and silver brazing), and two large gas furnaces.

Silver brazing with gas torch equipment still gets a big play. It does not require expensive equipment or special accessories and is ideal for limited production runs.

Black & Decker® Portable Grinders are POWER-BUILT TO LAST!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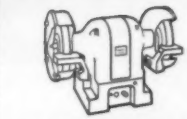
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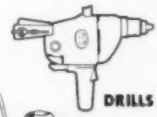
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PORTABLE ELECTRIC TOOLS

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ACCO products

Get exactly what you want when you buy PAGE

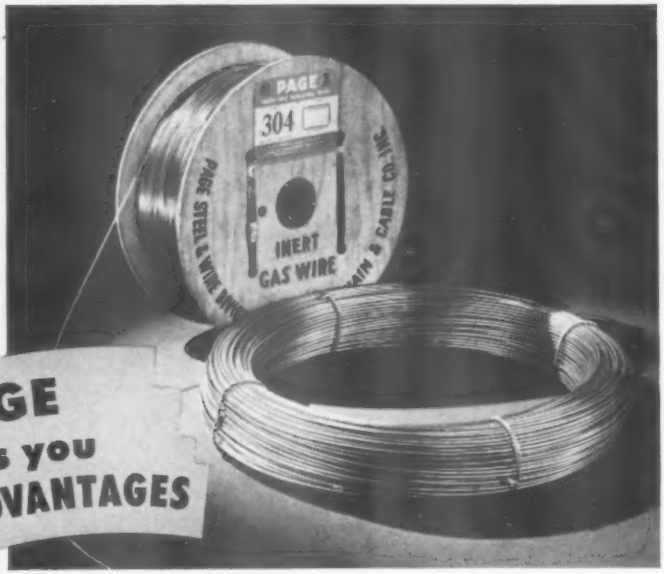
SEE OUR BOOTH 38

WELDING SHOW

MAY 9-11

MEMORIAL AUDITORIUM

BUFFALO, N. Y.



PAGE gives you 3 BIG ADVANTAGES

Advantage No. 1

You get the exact analysis you need from the PAGE range of 26 Analyses

• There's no need to compromise on welding wire for that "special" job—for, no matter how different your requirements may be, you can get *exactly* the right wire from PAGE. *There are 26 different analyses in the* PAGE *line.* These cover the field of applications: heavy automatic submerged arc...light manual submerged arc... inert gas manual...automatic, tungsten or metal arc.

CARBON STEEL • Any carbon from Armco (.025 max.) to high carbon (.90—1.10)

LOW ALLOYS • All the most popular welding grades

STAINLESS • All standard AISI grades. Other types on request

PAGE offers a wide range of Gas Welding Rods • Electrodes • Spray Wire

• Your welding job deserves the right electrodes and the right rods—and you can get them from the range offered by PAGE!

Gas Welding Rods • Armco, mild steel, low alloy, 3½% nickel, carbon or stainless steel, manganese or naval bronze.

Bare Electrodes • Any carbon from Armco to high (.90—1.10) carbon.

Metal Spray Wire • Any carbon from Armco to 1.00 carbon; also 3½% nickel, manganese or naval bronze, and stainless steel.

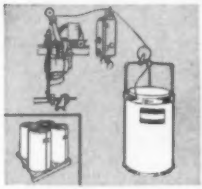
Circle No. 79 on Reader Service Card.

—you don't have to compromise Automatic Welding Wire!

Advantage No. 2

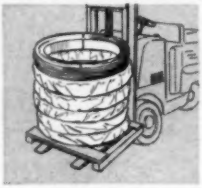
You get Automatic Welding Wire packaged to fit your requirements

• The PAGE Automatic Welding Wire packaging program was developed out of long experience and careful study of users' needs. These fine wires are packaged in a variety of ways for the most complete protection and the utmost convenience in handling and in stocking.



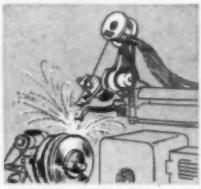
LEVERPAKS and PAY-OFF-PAKS

Lightweight and durable, Leverpaks and Pay-off-paks protect against coil distortion or wire corrosion. Compact, easily opened and resealed, roll and stack easily, take little floor space.



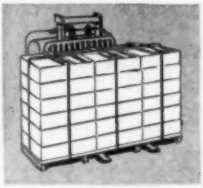
WRAPPED COILS

PAGE also offers single and pallet-mounted (1,000 lb., 2,000 lb. and 3,000 lb.) coils, each coil being wrapped in waterproofed paper and secured by steel strapping.



HANDY REELS

PAGE Inert Gas Welding Wire is available on reels: Precision thread-wound on twenty-five-pound, non-returnable reels to fit all popular inert gas welding machines.



COILS IN CARTONS

One of the most popular of PAGE packages: Coils in individual cardboard cartons, available either singly or palletized for easy handling by fork-lift truck.

Advantage No. 3

You buy from local stocks— and so you need only a minimum inventory

• You can get PAGE automatic welding wire, electrodes or welding rods quickly and easily from your nearby PAGE Distributor—no matter what part of the country you live in.

PAGE Distributors carry ample stocks from which your requirements can be filled without delay or inconvenience to you. This handy service not only saves you time in getting what you need, but makes it unnecessary for you to make a sizeable investment in inventory. Thus, your nearby PAGE Distributor is able to make double savings for you—a saving in time and a saving in actual dollars.

Get the full Analysis List

All the 26 analyses of PAGE Automatic Welding Wire are set forth in complete detail in new Folder DH-402. A free copy of this informative folder will be sent on request. Write our Monessen, Pa., office.

ACCO

Page Steel and Wire Division

AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

Better Value

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Latest Trends In Acetylene Usage Featured at I.A.A. Convention

THE annual conference of the parent gas association in this country, the International Acetylene Association, was held on March 12-14 in Los Angeles, California. It attracted hundreds of the nation's leading industrial executives, engineers and educators.

Although it is the one occasion of the year when members have an opportunity to get together, to renew old acquaintances, and to talk over matters of mutual interest, the conference has a more highly developed objective, since it acts as a funnel for the latest information developed by the engineers and research men, and also acts as a sounding board for various regulatory and standard bodies in this country and abroad.

Hard Hitting Technical Sessions

As the years progress, the position of the I.A.A. takes on added strength. This year's meeting is a good example. As a result of knowledge gained at the technical sessions, many businessmen came away armed with information concerning the marketability of acetylene solvents and acetylene itself for chemical purposes. Clearly, acetylene as a raw material has made possible an enormous number of new commercial products including synthetic rubber, plastics, dyes, and rayon, and as a consequence the I.A.A. has put increased emphasis on the chemical applications of acetylene.

Much of the material presented at the technical sessions by research men for research men rubbed off on delegates whose specialties are factory and production management. These works and production managers came away from the meetings loaded with data relating to applications, processes and methods which they would use in their own operations. Specifically, the technical sessions dealt with welding engineering and shop operations; special oxy-acetylene applications; use of oxy-acetylene in the transportation field and petroleum industry . . . And for many, the high point of the entire convention was the technical know-

George Slottman's work with acetylene has won him industry's highest honor.

Clarence McL. Pitts, Canadian industrialist and chairman of Conference.

how exchange session which dealt with the uses of acetylene and acetylene solvents.

Education Talks Attract Notice

An added feature of the meeting this year was an educational session, arranged by the Program Committee to provide for better understanding by educators and industrialists of the mutual problems faced in preparing young men to take places of responsibility in the acetylene field. The seminar and discussion was conducted jointly by educators and industrial leaders familiar with the various levels of education and with the needs and opportunities in industry. Judging by the response, it was a most successful undertaking.

Much credit for the success of the conference is attributed to the skill, industry and guidance of the presiding officer, Mr. Clarence McL. Pitts, vice president of the International Acetylene Association, and president of The People's Gas Supply Company, Ottawa, Canada.

Ex-Navy Secretary Speaks

The address at the opening day luncheon was given by Dan A. Kimball, president of Aerojet General Corporation, and a former secretary of the Navy. He spoke about the importance of rockets.

George V. Slottman Honored

On the evening of March 13, delegates witnessed the presentation of the James Turner Morehead Medal to Dr. George V. Slottman, Air Reduction Company, Incorporated, for his "scientific contributions to carbide, acetylene and oxygen technology." The award was presented at a banquet by E. A. Daniels, director and past president of the Association. Dr. Slottman was cited as a person of great distinction in the industry. He attended Massachusetts Institute of Technology and graduated in 1925. In 1927 he received a Ph.D. from the University of Berlin. During

the years 1927 through 1930 he was professor of chemical engineering at M.I.T. From 1930 to 1934 he was chief combustion engineer and iron works manager, United Steel Companies, Ltd., Sheffield, England. In 1934 Dr. Slottman joined Air Reduction Sales Company as manager, Technical Sales Division. In 1949 he became director of research and engineering. Since 1952 he has been vice president, research and engineering.

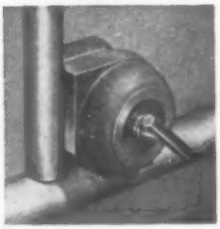
Dr. Slottman is a member of the American Welding Society; American Iron and Steel Institute; The Institute of Welding, London; The Iron and Steel Institute, London; International Acetylene Association; Compressed Gas Association; and the American Ordinance Association. He is the author of many books and papers relating to the oxy-acetylene industry. The dedication ceremony added the crowning touch to a series of eventful meetings and technical sessions.

McElhoe Named Smith District Manager

H. L. McElhoe of Edwardsville, Illinois, was recently named as Smith Welding Equipment Corporation's district manager in the southern district. Mr. McElhoe worked as a factory representative for five years before being appointed to his present position. He will be responsible for sales of the company's products in the southern and southeastern states. Mr. McElhoe has a reputation as an expert in the welding field, as well.

pays for itself in a week

The Welder's mate . . . . . Use it for holding pipes, bars, angles, plates or sheets, on all classes of welding. Save a pair of hands, time and money.



MAGNETIC HOLDER

For descriptive literature and address of sales agent in your area, write to

JAMES NEILL & CO. (U.S.A.) LTD.
37/39 PEARL STREET, NEW YORK 4.

PH 19

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Defects in diesel valves brought out by conventional penetrant are shown at top. Lower: New type penetrant displays greater sensitivity, shows up more of the hard-to-find defects.

New Penetrant Shows Up Hard-To-Find Flaws

Developed to indicate both very tight and very shallow defects, a new fluorescent penetrant contains no emulsifier. The emulsifier is added after penetration by a separate dip. Thus both emulsification and washing time can be controlled to suit the particular part or type of defect. For broad, shallow flaws a short emulsification time is used so that none of the penetrant is washed out of the defect. Emulsifiers, when part of the penetrant, tend to reduce penetrability. The new penetrant, with no emulsifier in it, therefore does better with tight cracks too. Low cost water spray is still used for washing. Photos and data courtesy Magnaflux Corporation.

MONEY-BACK TRIAL OFFER
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. $3.30 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. $3.35 per gallon, f.o.b. Dayton.

PROTECT-O-METAL

G. W. SMITH & SONS, INC.
5402 KEMP ROAD, DAYTON, O.

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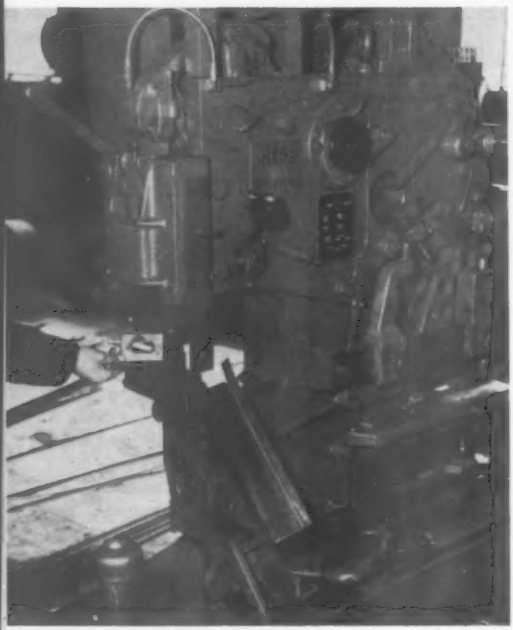


Versatile punch-shear machine produces shim in single stroke. Formerly, two separate holes were punched and a shear or cut-off strike also made.

Tank sections are aligned by hammering a tapered punch bar through the other end of shim slot on outside of tank. This assures an even gap.

Shimming Method Aligns Tanks

A METHOD of shimming tank sections for butt welding recently adopted by Brown Boiler Works, Franklin, Pa., speeds welding and improves quality of weldments.

Brown builds all-welded tanks from 18-inches to 15-feet in length, in varying diameters, according to Underwriters' Laboratory standards or API specifications. Most of these are vertical cylinders used for blending and mixing in refineries and for other manufacturing and storage purposes.

Although much field welding is butt work now, the company believes shop welding should be the same.

Therefore, the firm recently installed a new punch shear-type of machine which knocks out specially designed shims for speeding tacking and butt welding in the shop. A Brown-made shim is about

Shims seen here are inserted in joint just after tacking and held in place on tank interior by two-inch steel pins. Shims and pins are salvaged for re-use.

for Butt Welding

⅛-inch by 2½-inches by 4-inches with an elongated hole through its center about ¾ to one-inch from end to end.

Shims Align Tank Sections

Tacking proceeds with two tank sections aligned on the shop floor. After several inches of tack welding, one of the shims is inserted with a two-inch steel pin on the tank *interior* and through the shim's small end. Then a tapered punch bar is hammered through the other end of the shim slot *outside* the tank. This draws the tank sections into alignment, assures an even gap for butt welding and gives better penetration and appearance.

Before welding, Brown applies an anti-spatter compound over the edges to be welded. This permits easy cleaning with a wire brush before painting and also aids final tank appearance.

After tack welding, tank remains on the floor for interior seam welding with an E-6010 electrode.

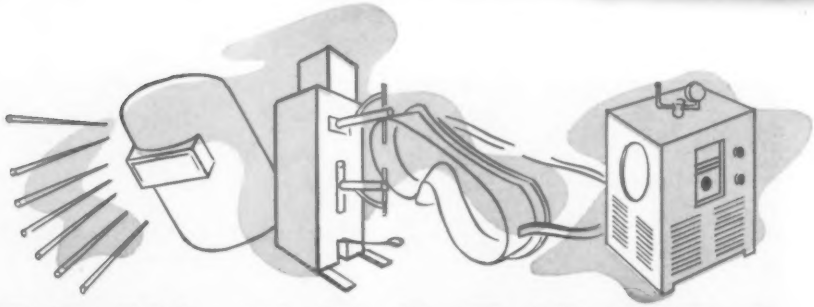
Use Welding Platform

Because space is a problem, Brown rigged a homemade traveling platform about 20-feet high that reaches over about 10-feet from its vertical members. This positions a welding operator right on top of the tank being welded. The platform is fabricated from angle iron and is mounted on several homemade wheels that roll diagonally in four-inch angle iron at floor level. Movement is manual.

Two more wheels travel a monorail-type bar sideways from the platform and are connected to the platform structure with horizontal members.

Operators climb a simple ladder to get into position over the work.

Photos courtesy Lincoln Electric Co.



NEW PRODUCTS

New AC-DC Arc Welders

Manufacture of two series of AC-DC arc welding machines has been announced by Miller Electric Manufacturing Co., Inc.

The SRAC Series are designed for metallic arc welding. These are available in 200, 300 and 400 ampere ratings, with or without power factor correction.

The SRTA Series are designed primarily for inert gas and inert gas spot welding processes. These welding machines are available in 200 or 300 ampere models and all are power factor corrected.

Both series of these AC-DC welders operate from a single phase power line, and current can be controlled remotely at the welding position.

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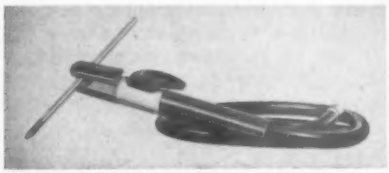

Cutting and Gouging Torch

A new Model G-5 cutting and gouging torch has been introduced by Arcair Company for heavy duty work and longer service life. It features new, impact-resistant moulded jaw insulators and a new silicone glass laminate sleeve to protect upper end of handle from heat. New torch will use up to 5/8-inch diameter carbon electrode and delivers almost twice as much air as the previous G-3 model.

Model features a rotating nozzle that permits changing electrode angle to suit job. It operates from an ordinary DC welder and compressed air line.

Circle No. 14 on Reader Service Card.

Use Reader Service Card for additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

Remanufactured Ignitrons

Remanufactured ignitrons which carry a new tube warranty and bring a considerable saving to the user are now available, according to a recent announcement by the General Electric Company's Tube Department.

The remanufacturing plan covers types GL-5551, GL-5552, and GL-5553A (sizes B, C, and D respectively), which are used extensively in welding and other power conversion applications. Using remanufactured tubes for replacement is said to bring savings of nearly 30 per cent per tube.

In the remanufacturing process, General Electric explains that it maintains the same quality control conditions that prevail in making new ignitrons. Process includes replacing the ignitor, mercury and the remainder of the cathode assembly with new parts.

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4th ANNUAL
WELDING SHOW
BUFFALO MEMORIAL AUDITORIUM
MAY 9, 10, 11

At the

WELDING SHOW

see the latest developments in Alcoa® Filler Metals and Fluxes for welding, brazing, soldering.

ALCOA—BOOTHS 64 & 65

New improved straight-length Alcoa Welding Rods.
Additional Alcoa alloys in spooled IG* electrodes.
Convenient new Alcoa packages . . . and many other new developments.
See you at Buffalo next month.

* Inert Gas

ALUMINUM COMPANY OF AMERICA
1742-D ALCOA BLDG., PITTSBURGH 19, PA.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

ALCOA ALUMINUM
WELDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

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Latest Cut Off Wheels

New line of cut off wheels called the B7 line was announced recently by the Bonded Abrasives Division of The Carborundum Company. According to the manufacturer, the new line of aluminum oxide resinoid cut off wheels combines all the desirable qualities essential to dry production metal cut off operations.

These wheels are said to produce a faster, cooler cut because of the characteristics of the new B7 bond. Special process in the manufacture produces sharp sides on all wheels to prevent binding in the cut, and the high bond strength is said to combine with freedom of cut to produce trouble-free operation.

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a NEW product means NEW time saving and important NEW production gains

York's

SPAT-R-PRUF COMPOUND 106

don't sputter about spatter . . .
JUST WIPE IT OFF

Completely eliminates grinding after welding. Just one coat, and spatter can be wiped away with a dry cloth.

- NO STIRRING OR DILUTION
- NON-TOXIC
- NON-INFLAMMABLE
- NO ODOR
- HARMLESS TO SKIN
- PERFECT PAINT BASE
- HELPS PREVENT RUST
- NO WELD POROSITY

Available 1 or 5-gal. cans, 55-gal. drums

3 in 1 York's '77'
SPECIAL FLUX
FOR GENERAL BRAZING
FOR CAST IRON WELDING
FOR CAST IRON BRAZING

YORK ENGINEERING COMPANY
3349 W. Ogden Ave., Chicago 23, Ill.

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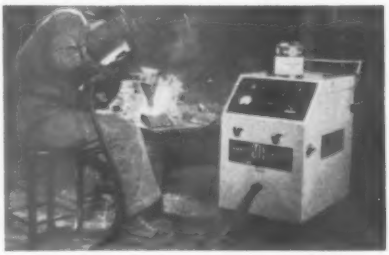

New Semi-Automatic Welder

A portable welding machine designed for manganese steel and hardfacing work on irregularly-shaped parts is now available from the Amsco Division of the American Brake Shoe Company.

The MF Welder, mounted on large industrial casters and displacing no more space than an average floor model television set, is designed to plug into conventional A-C or D-C welding units by a single cable. The MF operates on a current range of from 150 to 450 amps. Unique feature of the MF is the conical hopper mounted directly above the welding wire outlet as a means of storing and feeding flux. The flux adheres to the wire by the magnetic field created by welding current, and the hopper is said to carry flux for 15 minutes of welding.

Circle No. 137 on Reader Service Card.

Snap-Around Volt-Ammeters

Addition of three junior-size snap-around volt-ammeters to its line of current measuring instruments has been announced by Pyramid Instrument Corp. Now available are Amprobe Juniors in 0-125/250 volt models in current ranges of either 0-10, 0-25, 0-50 and 0-100 amperes AC and in 0-150/600 volt models in current ranges of either 0-25, 0-50 or 0-100 amperes AC.

Circle No. 138 on Reader Service Card.

CUT COSTLY DOWN TIME

. . . get stronger welds faster with Bridgeport No. 192 Low-Fuming Bronze Rod

A cast steel valve chamber, controlling fluid from a 1200 psi pump, spelled shutdown for an entire operation when it developed a crack. Instead of replacing the unit at considerable expense in both money and time, a shop welder repaired it quickly, cheaply and permanently with Bridgeport No. 192 Low-Fuming Bronze Rod.

Bridgeport No. 192—recommended for all-purpose welding—is a low-fuming manganese-type rod that tins readily with only local preheating. Because the temperature of the surrounding metal requires relatively little preheating, brittleness is avoided. This also means a saving in gas and labor, and often produces a weld stronger than the base metal.

You can have the whole money-saving story of Bridgeport No. 192 Low-Fuming Bronze Rod and other Bridgeport Alloys in our new booklet, "Bronze Welding—Modern Tool of Industry." Write for your free copy today.

Bridgeport BRASS CO.

BRIDGEPORT BRASS

Offices in Principal Cities • Conveniently Located Warehouses

Bridgeport Brass Company, Bridgeport 2, Conn. • In Canada: Noranda Copper and Brass Ltd., Montreal

BRASS • BRONZE • COPPER • SHEET • ROD • WIRE • TUBE • ALUMINUM EXTRUSIONS AND FORGINGS

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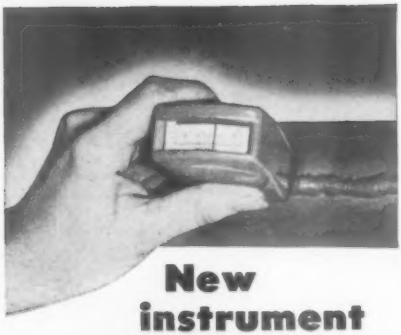


New instrument measures iron content in weld

The Ferritic Elcometer instantly and accurately measures ferrite content in a stainless steel weld. This new precision instrument replaces time-consuming destructive laboratory analysis. It enables you for the first time to make rapid, on-the-spot, nondestructive tests for iron content at various points along a weld.

Measures magnetic intensity

Operation is based on the principle that increase of magnetic flux intensity between two soft iron test probes of a U-shaped magnetic circuit reduces the forces in a spring-loaded magnetic needle in a parallel magnetic branch. Tension of spring is adjustable so that needle gives scale reading corresponding to ferrite content of standard reference sample.

Accurate readings in all positions

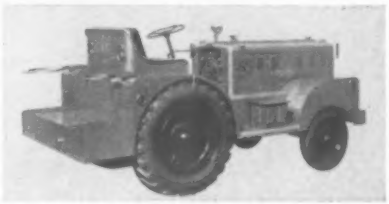
Needle locking device assures correct readings. Balanced in all planes—readings can be taken at any angle. Sturdily constructed. Comes in tough leather case. Fits in pocket. Write today for complete information.

FERRO CORPORATION
4139 E. 56TH STREET
CLEVELAND 5, OHIO

Circle No. 41 on Reader Service Card.

Self-Propelled Welding Unit

A self-propelled welding unit, with engine directly coupled to the generator, not a tractor with a generator driven through power take-off, has been announced by Hobart Bros. Co. Unit is designed to provide a mobile, self-propelled unit for installations in which welding applications occur at widely separated points. Unit has towing capacity rated at 2,000 pounds draw-bar pull.



The 400-amp model is powered by a Chrysler 6-cylinder industrial engine and 600-amp model by a Chrysler V-7 cylinder power source. Weldmobile can also supply one kilowatt auxiliary power.

Circle No. 141 on Reader Service Card.

New Cement For Polyvinyl Chloride

A team of laboratory technicians has developed a new solvent cement for joining polyvinyl chloride pipe fittings and flanges. It is said to make possible a joint as strong or stronger than the pipe itself, and also to bridge a greater diametral gap than any other previously available bonding agent.

The new Plastics Solvent Cement is simple and economical to use. An ordinary paint brush usually serves as the applicator. A cemented joint can be handled in an hour and reaches working strength in 48 hours. It is furnished in pints, quarts and gallons.

Circle No. 142 on Reader Service Card.

All-Position Electrode

Designed for ease of operation, an all-position E6013 electrode, Fleetweld 37, for AC or DC current, has been announced by Lincoln Electric Co. Electrode is said to have excellent arc stability and is said to be particularly useful in welding sheet metal where burn-through, sticking and poor fit-up may be problems; or when using low open circuit voltage welding machines, such as used on farms or in small shops; or for steel plate fabricating where an all-position easy operating electrode is desired.

Circle No. 143 on Reader Service Card.

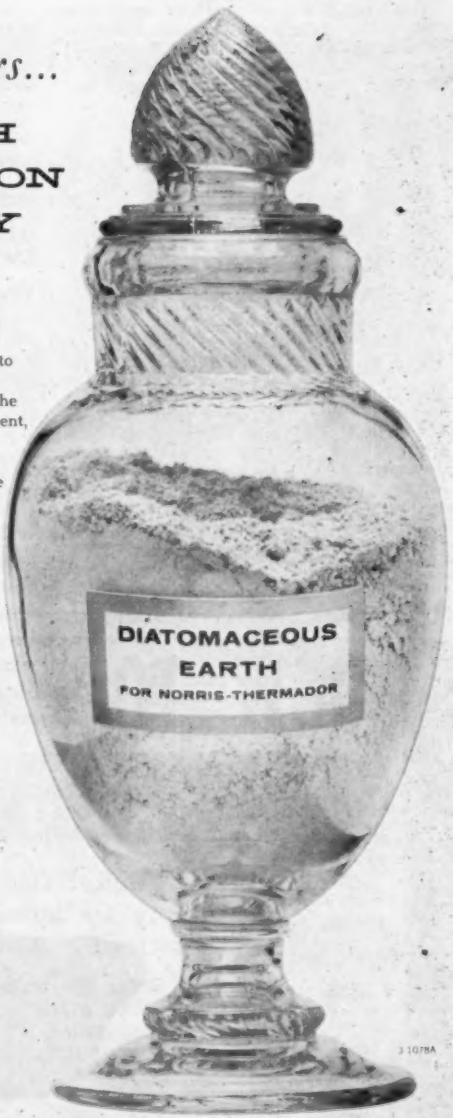
Acetylene Cylinders...

FILLED WITH PRESCRIPTION ACCURACY

Millions of years ago at the bottom of the ocean! Today – inside Norris-Thermador Acetylene Cylinders!... That's *diatomaceous earth*, containing microscopic diatoms by the billions – selected with exacting care, tested to a precise quality standard, and laboratory-compounded for *prescription accuracy* with the three other filler components – charcoal, cement, asbestos. That's why the filler has higher permeability and lightness... why Norris-Thermador cylinders take gas faster, fill more uniformly, give top performance.

NOTE THESE OTHER FEATURES

Cold-drawn construction... light weight for easy handling... bases curled *under* for maximum strength and compact storage... larger cap holes... tags easily read without having to remove them... all welding X-ray controlled... specifications ICC-8 met and exceeded.



Acetylene Cylinders from 10 to 300 cubic feet capacity. Write or wire for specifications on all sizes. Cable Northerm.

NORRIS-THERMADOR CORPORATION

5215 SOUTH BOYLE AVENUE, LOS ANGELES 58, CALIFORNIA. DEPT. IW-456

Circle No. 76 on Reader Service Card.

Quick-Change Angle Vise

The new Palmgren No. 23B angle vise with swivel base permits quick, accurate setups at any angle without use of clamps, wedges, or other makeshift methods. Developed by Chicago Tool

and Engrg. Co., unit has 3-inch jaw width, 3-inch jaw opening and 1¾-inch jaw depth. It can be used with or without the 360° graduated swivel base and can be set at any angle from 0° to 90° in a vertical plane. It also can be used as an ordinary machine vise in the horizontal position.

Circle No. 144 on Reader Service Card.

Steel Conduit Bender

The new Benfield "Redege" Bender is a one piece hand tool for bending types of rigid steel conduit and electrical metallic tubing. The tool—first universal hand bender ever introduced for use with rigid conduit and thin wall tubing—is being marketed by National Electric Products Corp.

Made of special analysis pearlitic iron and finished in aluminum paint, with bright red edgings and markings, this compact portable bender is available in three sizes.

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Wire Processing Machines

Fast, accurate and economical wire straightening and cutting is said to be made possible by many exclusive features of Lewis 2-C wire straightening and cutting machines, manufactured by Lewis Machine Co. Two models are available: No. 2-C3 for wire from $\frac{1}{16}$ to $\frac{3}{16}$-inch and No. 2-C4 for wire from $\frac{3}{16}$ to $\frac{1}{4}$-inch. Machines process all commonly used types of materials.

Practical design and sturdy construction are said to assure uninterrupted service and maximum production at minimum cost.

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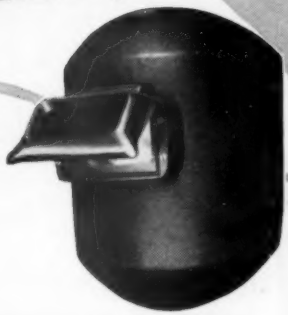
Welders Cup-type Goggles



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IDEAL
Protection Equipment
to meet every welding requirement

CESCO **No. 401-2** is a favorite all-purpose helmet. It features the No. 2 lift-front lens holder with shock-absorbing action. Its use permits easy layout and inspection of work. It has every safety and comfort feature of a good welding helmet. The one-piece seamless shell is drawn from hard vulcanized fiber. The chin rest is adjustable as is the form-fitting headgear.

Speed-Shift
Goggle

These new CESCO **Welders Cover Goggles** have been completely redesigned for easy fitting over the larger personal glasses. The increased size gives ample clearance without snagging. The goggles rest entirely outside the eye sockets. They give more comfort with better seal against light flashes. Cups are light, sturdy plastic. Ventilation ports allow circulation without entrance of light.

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Welding Helmet

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Fiber Spectacle

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and CASTINGS

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SIMPLE TO OPERATE, the Arcair process is based on the gouging, cutting, grooving or beveling of any metal by melting it with an electric arc and blowing away the melted metal with a high velocity jet of compressed air. An ordinary D-C welder and regular shop compressed air are all that is required.

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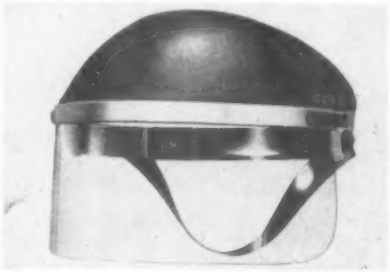
All-Purpose Face Shield

A new all-purpose face shield for general shop work is announced by Chicago Eye Shield Co. This CESCO 770 face shield comes in three window lengths of 4, 6 and 8-inches, measured from top to bottom. Windows mount inside an aluminum channel in a tight assembly which is impervious to entrance of dirt or liquids.

Unique feature is complete flexibility of entire headband. It is said to be as flexible as the old elastic-type bands, but much longer lived. There is no metal or



mechanical adjustment to snag the hair. Headband of vinyl plastic is adjusted by sliding strap. Shield conforms to the head at all points. Windows are of cellulose-acetate and may be green or clear.

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Low-Slag Electrode

A general purpose high-speed, low-slag electrode designed for a variety of mild steel welding requirements is announced by All-State Welding Alloys Co., Inc. Low amperage (40 to 225 amps) deposits from this electrode exhibit a tensile strength of 65-75,000 psi, a yield strength of 58-63,000 psi and a 26-34 percent elongation in 2-inches.

Designated as All-State Steelarc, it is applicable with AC or DC welders and is available in $\frac{1}{16}$, $\frac{1}{8}$, $\frac{5}{32}$ and $\frac{3}{16}$-inch core sizes. Sealed tin-plate packages are 10 pounds; there are six packages to a carton.

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2. STRONGER

. . . and more dependable! You get service-free production as it withstands abuse and rough handling.

3. COOLER

. . . the special stainless steel torch head is seven times less heat conductive than brass . . . cooler handles keep welders on the job!

4 MODELS A model for every welding and cutting need. Super-Jet, Aero-Jet, Star-Jet and Jet-O-Matic.

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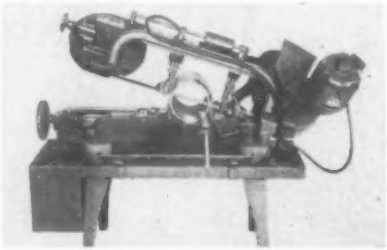
Larger Cut-Off Saw

Designed with larger capacity for metal cutting on medium production jobs, general utility or tool and stock room work, the Model 600 horizontal band



saw has been introduced by Wells Mfg. Corp. to replace its No. 5 unit.

Model 600 has a rectangular capacity of 6 x 13-inches and will handle 6¾-inch diameter or 6-inch pipe. Blade is 8-feet 2½-inches by ⅝ by .032-inches. Selective speeds are 50, 90, 160 or 250 fpm. Floor area is 21 x 50-inches and top of bed is 25½-inches above the floor.

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Goggle-Cleaning Station

A complete, disposable goggle anti-fogging and cleansing station has been announced by Pulmosan Safety Equipment Corp. It is a self-contained unit which houses an anti-fog and cleaner solution, wiping tissue and used tissue disposable space. The solution is said to stop both fog and clean in one application.

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Stop Brazing Alloy Waste

Limit the flow of brazing alloys to the joint area with Nicrobraz Green Stop-Off. Prevent the waste of brazing alloy and the contamination of threads, holes, and other vital surfaces. Improve product appearance. Use it with torch or furnace brazing.

Apply Nicrobraz Green Stop-Off around areas to be brazed. No brazing alloy will creep over a Stop-Off protected surface. Write for more information.

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All carbon steels are now being welded successfully with this inexpensive new method.

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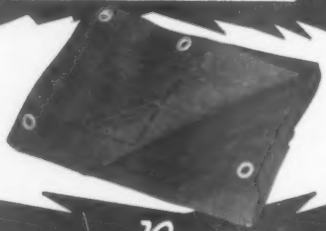

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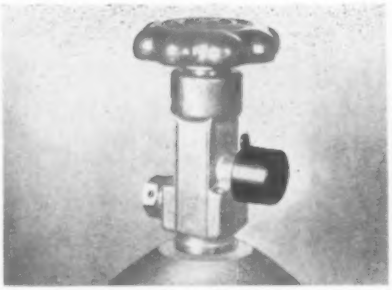

Plastic Caps for Gas Cylinder Valve Outlets

An inexpensive flexible plastic cap designed to offer improved protection for gas cylinder valve outlets during shipping, handling and storage has been announced by S. S. White Plastics Division. Caps are said to assure positive protection against thread damage and keep dirt and moisture out of the outlet. Made of a flexible vinyl rubber-like plastic, caps hold by friction and suction and will not shake off or jar loose. Yet, they can be readily removed by simply pulling back on a tab.

Caps are made of a non-shredding plastic so there is no danger of residue or fibrous material being left in the outlet after removal. This is desirable in case of valves used on cylinders containing oxygen and Nitrous Oxide.

Caps are available in two sizes for .325-inch O.D. and .903-inch O.D. threaded outlets.

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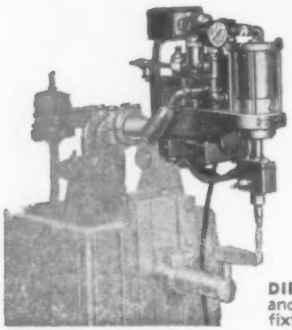

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ADVANCED DESIGN—Dockson Goggles are safety engineered by eye protection specialists to give you the most modern protection available.

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TOP CONSTRUCTION—Over 30 years of dependable craftsmanship is yours in every Dockson Goggle. Only the finest materials are used.

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No. 176 SERIES—A headgear goggle for general welding use that may be worn close to the face or at any adjusted off-the-face angle.

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If you're looking for cost saving short cuts in sheet metal welding you will want to read how Stemco Mfg. Company solves its problems . . .

High Current Setting

by **DAVE RITCHIE**
Editorial Assistant

ARC welding sheet metal presents several problems: Fit-up must be accurate. In welding 10 gauge sheet metal, a gap equal to half the sheet thickness produces something like 75 percent penetration—close to the maximum obtainable with any degree of reliability without resorting to a backing strip—but using this rule of thumb for thinner gauge material would result in a gap so small that it would be impractical to produce. Another problem, related to fit-up, is that of burn-through, where the pressure of the jet of molten metal coming from the electrode will burn its way through the sheet, unless it is controlled.

These problems—and many related ones—got concentrated attention from the production staff of Stemco Manufacturing Company, St. Charles, Missouri. Well-known for its heavy duty truck mufflers, this company had a practical reason for wanting to know the answers: they recognized that improved methods make for lower costs.

Stemco mufflers are completely arc welded. No rivets are em-

Last weld is being run vertical down on this muffler. Operator welds at rate of 50 to 60 inches per minute.

Air actuated jaws, and air cylinders that control them, are used in this welding fixture for muffler body tubes.

Result in Excellent "Mileage"

ployed because of the added expense of preparation, nor are spot welds used because they are said to give insufficient coverage to withstand heat changes and are difficult to inspect.

According to Stemco's Ben Cook, —"Rather than resort to a copper backing strip in order to lick the problem of fit-up, we have discovered that a clamping device is a practical aid in maintaining accurate fit-up of the butting edges of the tubes, and adds considerable versatility to our operation."

The plant uses several sizes of clamping devices to accommodate muffler body tubes. These fixtures have air actuated jaws which clamp firmly around the work. The air controls are operated by a foot switch. Jaws of the fixture are made interchangeable, to accommodate tubes of different diameters.

Operator Welds Downhill

In the sequence followed in welding the longitudinal seam of the tube, the welding operator selects the part to be welded from a convenient bin located on his left hand side. He places the tube upright in the open fixture. Depressing a foot switch closes the jaws firmly upon the work piece. Holding the electrode at a 45° angle to

The end-bell spout sub-assembly is joined with an inside fillet-weld. Nest supports the bell.

Star and ring baffles are placed in each bell unit and welded. Rack accommodates twenty units.

the seam, the operator welds the seam in the vertical down position, using a drag technique. Welding downhill in this way decreases the tendency to burn through joint members since the pressure of the arc is less concentrated on the joint.

High speeds are possible using this technique. Because of the higher rate of deposition of the metal, there is no problem of having the flux flow ahead of the metal and in that way prevent complete fusion.

When the weld is completed, the operator again depresses the foot operated switch causing the jaws of the fixture to open, and the welded tube drops into a bin and is transported to a final assembly area where the end bells are attached.

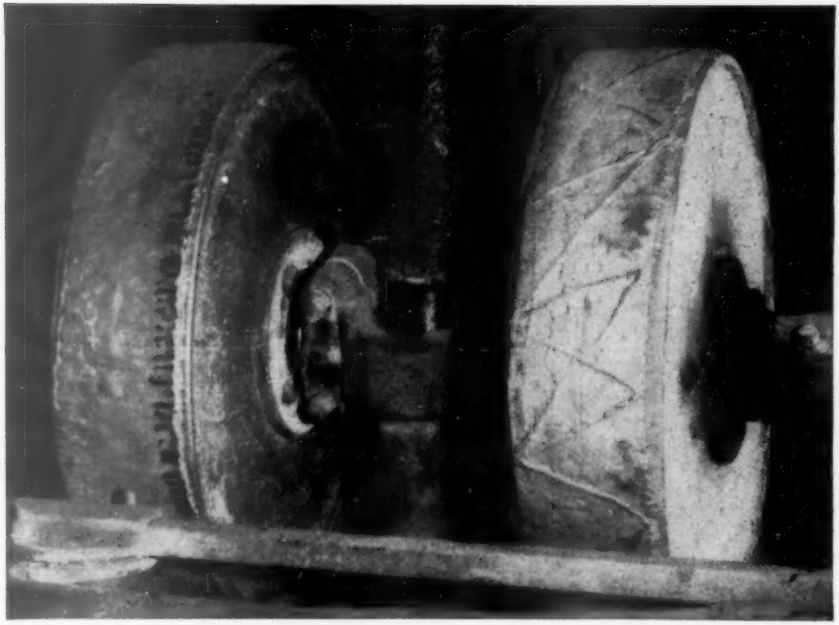
Using Correct Rod Important

"Part of our success in this operation," Cook acknowledged, "lies in our effective use of the correct type of rod—a rod that can take high temperatures without falling apart." Welding vertical down on 16 gauge cold rolled steel, using a ⅛" E-6011 type electrode at 180 amps, the operator obtains travel speeds of 50 to 60 inches per minute. This electrode uses straight (negative) polarity, and this accounts for a concentrated jet of molten metal coming off the tip of the electrode. To prevent burn-through, the operator must move very fast and very accurately.

This is the type of electrode so effectively used in the welding of automobile frames and bodies where its high speed, fast follow, minimum build-up, and readily removable, thin slag offer added advantages over other types of electrodes.

End-Bells Complete Job

The end-bell spout sub-assembly is welded in another section of the plant. The spout tube is fitted snugly into the circular opening cut in the dome of the end-bell. The unit is then placed in a nest, and an inside fillet weld joins the two parts. Following this, the end-



14 Times the LIFE... by ***Hard-Facing***

The hard-faced rolls on this rock-crusher mill have been in constant operation for 6 years. During this time, the rolls have been pulverizing such abrasive materials as ferro-alloys, ore, dolomite, feldspar, rock, and sand. Unprotected rolls had to be replaced every 4 to 5 months.

There are 14 HAYNES hard-facing alloys . . . each developed to give top resistance to certain conditions of wear. Use them to protect metal parts from abrasion, corrosion, impact, erosion, or heat. All alloys are quickly and easily applied with standard welding equipment.

Ask your local Haynes Stellite dealer for literature describing these rods. If you don't know your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

See... or *Write...* | **Your local Haynes Stellite Dealer** / **to Haynes Stellite Company**

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bell with spout attached is placed in a rack. When twenty of these units are accumulated, a star baffle is placed in each end-bell and welded into place. This is a continuous operation, since, after finishing a unit, the operator moves on to the next one without interruption. Ring baffles then are welded in place in the end-bells. The same welding procedure is followed. The final welding operation involves joining the end-bell to the body tube with a circumferential weld. A 1/8" electrode is used at 160 amps, and metal is deposited at a rate of 45 inches per minute.

Welds are cleaned with a rotary wire brush, and the units are chemically coated for added protection.

The production people at Stemco have very effectively applied the old rule that within the limits of good quality welds, welding speed increases as current is increased.

Norton Co. Appoints New Sales Managers

The appointment of Donald L. Price as sales manager, grinding wheels, and George A. Park as sales manager, abrasives, has been announced by Ralph M. Johnson,

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vice president of the Abrasive Division of Norton Company. The move is designed to consolidate each product line under a single head.

As well, Robert Cushman, formerly West Coast district manager has been named assistant to the sales manager, grinding wheels. Prior to joining Norton, he was associated with the Gulf Oil Corporation.

Mr. Price will be responsible for the sale of all Norton grinding wheels and bonded abrasive products. He has been with Norton since 1920, and has served consecutively as field engineer, district sales engineer, abrasive engineer, and district manager. Since 1949, he has been a sales manager in both regional and national capacities.

Mr. Park will be responsible for the sale of abrasive grain, ore, and barrel finishing media. He joined Norton in 1910 as a member of the research laboratories. He later became sales engineer, abrasive engineer and district manager.

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That's the capsule story of 190-A—one of scores of precision welders—both arc and spot—from the forward looking engineering of BIRDSELL. More power per dollar of investment—more power per handy pound. Invest some time—call your dealer for a demonstration of welders, sensational in concept — unheard of in performance!
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New PREST-O-WELD welding heads ALL operate at same regulator setting

Spend more of your time welding. Stop readjusting regulators every time you change a welding head. Now you can set your oxygen and acetylene regulators in the morning and weld all day without touching them again, no matter how many head changes you have to make. PREST-O-WELD Welding Heads in 13 sizes (2 to 100 cu. ft. per hr. capacity), all operate at equal oxygen and acetylene pressures of 5 to 8 lb. per sq. inch.

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Midwest welding specialists are treated to an unusual series of technical talks by national authorities.

Personalities at the Conference. Upper left shows Robert R. Lincoln, chairman, Chicago Section of the American Welding Society, J. H. Humberstone, president of the Society, and John J. Chyle, president-elect of the Society. **Right,** Authors Donald B. Howard and Richard Raney go over points of their talk with Harry Schwartzbart, conference chairman.

Chicago Welding Conference Draws a Crowd

MORE than 300 welding specialists—executives, scientists and production authorities — recently attended a two-day conference at the Armour Research Foundation of the Illinois Institute of Technology in Chicago.

A total of 12 papers sparked the event sponsored jointly by the Armour Research Foundation and the Chicago Section of the American Welding Society.

Before the conference got under way, Host Chairman Harry Schwartzbart, supervisor of welding research at the Foundation, informed INDUSTRY & WELDING that the sponsors hoped to bring to welding specialists in the Midwest an up-to-date review of the newest practices and latest applications of welding in industry. Judging from the enthusiastic response of those in attendance, Harry Schwartzbart and his team of committeemen were highly successful in the undertaking.

Resistance Welding and Weld Design Emphasized

This year, the emphasis was on resistance welding and design for

welding. The main course consisted of talks on resistance welding fundamentals and applications of resistance welding; design for structural and plate welding; and the welding of heavy machinery parts . . . And, as an additional appetizer the delegates were treated to an interesting series of talks on nuclear reactor welding and welding for high temperature service. The progress report on CO_2 welding was thought provoking and resulted in much favorable comment. Weld testing — always a crowd gatherer—was discussed in a most interesting paper which brought out many of the recent techniques being applied in the welding industry . . . and powdered iron electrodes were also given thorough coverage.

Quality Of Papers High

Not only was the range of the program excellent—since it included many topics of general interest and others of a specialized nature—but also the quality of the papers presented were of high standard. Authors, chosen from all over the nation, are well known in industrial circles. As well, several of the session chairmen were selected from other related technical societies, and included Warren McGonnagle of the Argonne National Laboratory, who is chairman of the Chicago Section of the Society for Non-Destructive Testing; and Carl H. Samans of the Standard Oil Company of Indiana, who is Chairman of the Chicago Section of the American Society for Metals.

Authors Are Listed

The following is a complete list of the papers and speakers. Powdered Iron Electrodes . . . Donald B. Howard, American Car and Foundry Div., ACF Industries; CO_2 Welding—A Progress Report . . . Richard W. Raney, A. O. Smith Corp.; Non-Destructive Testing of Weldments . . . Roger W. Clark, General Electric Co.; Fundamentals of Resistance Welding . . . William Farrell, Sciaky Brothers; Resistance Welding Applications in Aircraft Fabrication . . . Earl B. Morris, Grumman Aircraft Engineering Corp.; Applications of Welding to Rocketry . . . Francis H. Stevenson, Aerojet — General Corp.; Design for Welded Plate Fabrication . . . Fred L. Plummer, Hammond Iron Works; Design for Structural Welding . . . LaMotte Grover, Air Reduction Sales Co.; Welding of Heavy Machinery Parts . . . Norman L. Mochel, Westinghouse Electric Corp.; Welding Austenitic Stainless Steel for High Temperature Service . . . Roy W. Emerson, Pittsburgh Piping and Equipment Co.; Joining of Heat Resistant Alloys . . . Harold E. Schultz, General Electric Co.; Welding Problems in Nuclear Reactors . . . Robert A. Noland, Argonne National Laboratory.

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BURT H. PAYNE

Stulz-Sickles Celebrates 40th Anniversary

STULZ-SICKLES Co. is 40 years old this year. The Company has been directly associated with the welding industry throughout most of its years of operation, and its board chairman, Burt H. Payne, is a pioneer in the welding of manganese steel castings with manganese-nickel steel welding electrodes.

Back in the Twenties, Payne reasoned that if an economical and effective way of replacing the worn-away metal with portable equipment could be developed, many thousands of dollars and hours of time could be saved. With this in mind, he began a series of experiments. These experiments culminated with the successful development in 1928 of a manganese-nickel steel electrode for the reclamation welding of manganese steel parts worn down through severe impact and abrasion.

Payne next considered the reclamation welding of dipper teeth. To get around the difficulties and expense of using welding electrodes alone to rebuild shovel or dipper teeth, he developed the first of a large family of manganese-nickel steel applicator bars, produced as rounds, flats, squares, triangles and special shapes. The first applicator bar took the form of a forged, wedge-shaped piece of manganese-nickel steel which conformed to the contours of the missing points of worn dipper teeth. It was found that these could be welded quickly and easily to the worn stumps.

Special shape manganese-nickel steel applicator bars were developed by Stulz-Sickles Co. in the latter 1930's for the rebuilding of worn crawler - tractor grousers.

Postwar expansion of industry has led Stulz-Sickles Company into many fields far removed from the mines and quarries of the earlier years. Applications for manganese-nickel steel were found to be effective in fabricating many new types of material handling and processing equipment, such as conveyor lines and shot blast equipment.

GB Silver Brazing Alloys

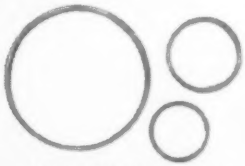
Used in Many Hospitals Where Safety Means Life or Death

Sound, leak-proof joints are a MUST in hospital construction requiring the piping of Oxygen and Anesthetic Gases to wards, rooms and nurseries *for instant use!* That's why leading designers and contractors specify dependable GB Silver Brazing Alloys, Preformed Rings and Fluxes.

GB Preformed Rings, for example, assure stronger, safer everlasting joints. They save time, require less metal, meet all specifications, cost less. Perhaps life or death are not a factor when you do silver brazing, but the dependability, efficiency and economy provided in GB products are good reasons for their choice . . . especially when they cost so little.

. . . Shown above is typical installation of oxygen wall outlet, snap coupler and flow meter. GB Preformed Rings are used to braze (1) wall assembly to screen; (2) tube to regulator; and (3) tube to gauge. For complete data write today.

GB FLUXES are fully active, deep penetrating, stable and economical. Produced under strict laboratory control they are extremely effective in producing high quality joints.



GB PREFORMED SILVER BRAZING RINGS are available in a wide range of sizes for all requirements. They are easy to use, save time and labor, assure lasting results.

GB SILVER BRAZING ALLOYS are made in random coils, strips and many special shapes in addition to preformed rings. Also available is Goldsmith's Technical Service Division cooperation for competent assistance in all brazing problems.

Dealer Distributor Inquiries Invited **Write for GB Data Book**

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Gas-tight zippered plastic tent mounted on rotating table and welding positioner protects molten titanium during inert arc welding operations.

"Under Cover" Welding of Titanium

AN ingenious technique for fusion welding titanium has been developed at Des Moines, Iowa, plant of Solar Aircraft Company. In a molten state titanium absorbs many gases—such as oxygen, nitrogen and hydrogen—that tend to make welds in the metal brittle. Therefore, fusion welding of titanium is usually done in a "controlled atmosphere"—by keeping air away from the weld, and by bathing the work with an inert gas.

In welding sizeable titanium aircraft components at Solar, it was found desirable to make a gas-tight zippered plastic tent. The tent is fastened to a rotating table on a welding positioner. The operator wears long-sleeved rubber gloves, sealed to the vinyl bag, to gain freedom of movement. Inside the plastic tent the atmosphere can be carefully controlled for perfect welds.

Since Solar builds many titanium components for new, high speed aircraft, company engineers have found many new methods necessary in forming, welding and machining titanium and its alloys.

AC-DC power source is used in inert arc welding demonstration.

Cooperation between A.W.S. and welding supply distributors results in a . . .

Successful Welding Clinic

MANY distributors in the welding field today rely on the "spoken word" to sell their products. Others not only send their sales envoys out into the field, but they also bring the customer back to plant and showrooms to demonstrate their products. This gives the distributor salesman an opportunity to tell his story with a minimum of disturbance.

Southern Oxygen Company recently conducted such a program when they played host to members of the Washington Section of the American Welding Society. Approximately 400 people visited Southern Oxygen's Bladensburg Plant between the hours of 9:00 a.m. and 5:00 p.m. to obtain first hand knowledge of the basic processes involved and the various applications and advantages of inert-arc welding.

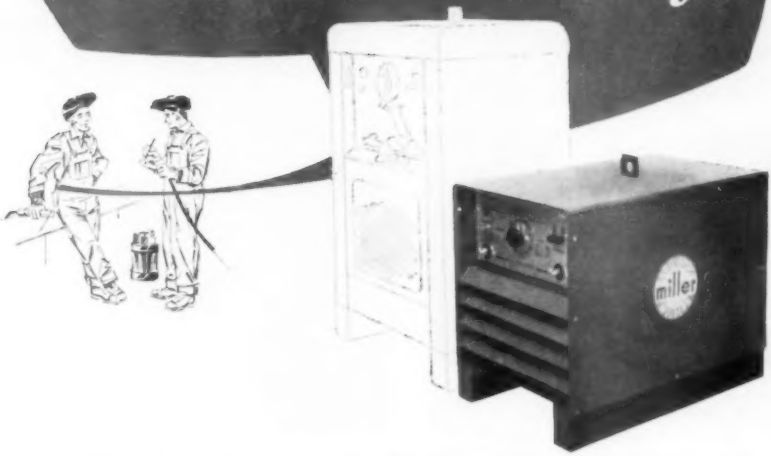
The morning and afternoon sessions consisted of live demonstrations of inert arc welding of mild steel, stainless steel, and aluminum.

A demonstration which caused considerable interest involved the welding of mild steel with carbon dioxide gas as a shielding medium and mild steel wire as filler material. Welding grade carbon dioxide was used for this series of demonstrations.

The Aluminum Company of America booth made quite an impression in this show. The Alcoa exhibit gave a broad picture of the various types of welds now possible on aluminum, and included specimens of turbines and electrical

(Continued on Page 141)

say, see the new **miller** *SRH low-boy?*



Where floor space is a problem — or where stacking and paralleling is indicated — the new Miller SRH LOWBOY is the engineered-to-your-needs answer! This dc rectifier type welder is available in three models with 60% duty ratings of 200, 300 and 400 amperes. Combining compactness with quiet operation, minimum arc blow, top electrical efficiency and waterproof construction, the LOWBOY is *another* Miller first that "figures."

Upright SR models to 600 amperes at 40 volts with 750 amperes maximum output; Duplex units up to 1200 amperes, 40 volts, 1500 amperes maximum.

" . . . if it's MILLER you know it's the finest . . ."

New — MILLER ARCWELD welding electrodes are worthy of the MILLER name and reputation. Ask your distributor for some . . . you'll like the job they do.

BE SURE TO LOOK US UP
AT THE SHOW IN BUFFALO
BOOTH 266

miller
ELECTRIC MANUFACTURING CO., INC.
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Distributed in Canada by
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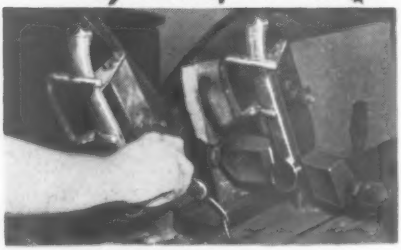
EASY-FLO
BRAZED CONSTRUCTION
...today's way of making metal products better— for less cost—more profit

FABRICATING FROM simple screw machine parts and stampings or tubing joined with EASY-FLO — that's EASY-FLO brazed construction.

EASY-FLO is the key factor, because this low-temperature silver brazing alloy just naturally produces high-strength, leak-proof, virtually indestructible joints in ferrous, non-ferrous and dissimilar metals. What's more EASY-FLO does this with unmatched speed and economy because of the alloy's low flow point and extreme fluidity.

The faucet spout shown, is typical of the thousands of parts and products now made better and at far less cost through effective application of EASY-FLO brazed construction.



Parts are held in fixtures with pieces of alloy preplaced and brazed by gas-air burners. One fixture is loaded while other is heating.

GET FULL EASY-FLO BRAZING FACTS NOW

Bulletin 20 will bring them. It may well open the door to better products and added profits for you. Write for a copy today.

Brass boss and sleeve of the faucet spout are screw machine parts. An EASY-FLO 45 shim and piece of bent wire make the joint at the boss end, and a piece of the alloy wire makes the sleeve joint. Tubing ends are precisely shaped to fit boss and sleeve.

In the brazed assembly at right, note neatness of the joints — just a fine line of alloy all around — evidence of the unrestricted capillary action and all-over penetration assured by EASY-FLO's exceptional fluidity. Finishing EASY-FLO joints is seldom necessary.

And here's the smooth, gleaming spout after plating. No sign of a joint is visible. From every angle, it's the equal of a single, homogeneous piece.

Photos and data courtesy of the Delta Detroit Corp. Detroit, Mich.

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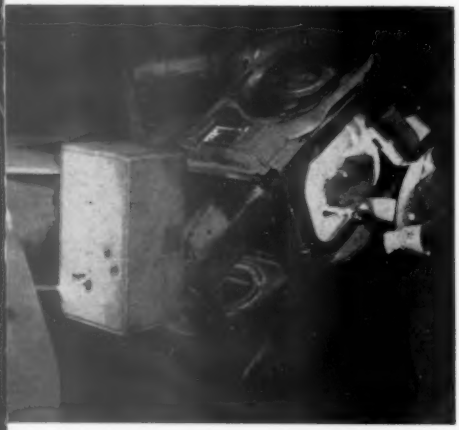


HOW CATERPILLAR TRACTOR GETS QUALITY WELDS

Welding operators are important in Caterpillar's Quality Control Program: Their comfort is insured by positioners (top) which permit downhand welding at all times; their techniques are checked by series of qualification tests checked by qualification tests (bottom).

QUALITY welding at Caterpillar Tractor Co., Peoria, Ill., is maintained by close attention to four important factors. These factors include operator training, safety and comfort; laboratory control of welding materials; cooperative control of production welding and use of latest inspection methods and devices.

Operators are Important

Caterpillar's training program involves both classroom instruction and "on-the-job" experience. Instructors are skilled operators who have graduated from this same training course or one similar to it. Classes are small enough so that each student gets individual attention from his instructor.

Another function of the Training School is to test applicants for welding jobs. A person desiring a job as an operator must first pass qualification tests. If the applicant has not welded for some time he is permitted a practice period before taking the test.

Production welding operators

"if welds on a certain assembly are defective, all similar assemblies produced are inspected until trouble is eliminated"

Magnetic particle inspection of welded joints is an important part of Caterpillar's non-destructive program. Inspector points out defects, if any, to operator.

must take these same tests at assigned intervals. If one fails, he cannot weld in production until he has made satisfactory tests. If at any time an operator appears to be doing a poor job he can be required to take the tests.

Safety and comfort are also important parts of quality control at Caterpillar. Welding positioners are used to make work easier and permit welding in downhand position. Handling equipment, such as hoists, cranes and conveyors, is always within easy reach.

Safety stores are conveniently located throughout the plant, but most of the equipment and clothing needed is furnished by the company.

Control Welding Materials

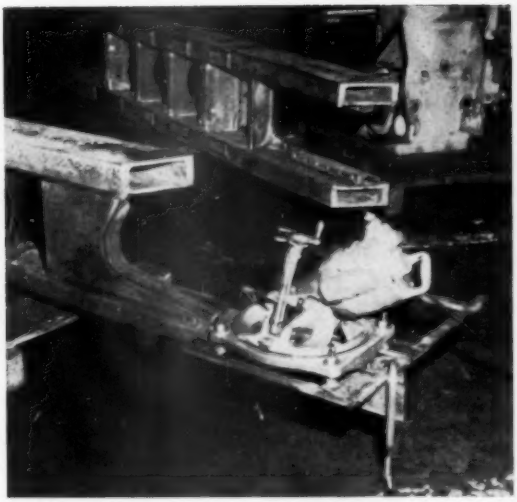
Constant inspection and testing of steel, welding electrodes and wire, fluxes and other welding materials by Caterpillar's Metallurgical Division insure high quality welds.

Before welding electrodes of a new type or from a new source can be used, they must first meet rigid physical and chemical standards. Initial testing requires close cooperation of Inspection, Planning, Production and Metallurgical Divisions. Representatives of these divisions witness all phases of investigation and each has a voice in making final decisions.

The welding section of the Metallurgical Laboratory deals with many shop problems, investigations and testing of welding electrodes, submerged arc welding wires and fluxes.

By routine testing of electrodes, the Metallurgical Laboratory determines if a shipment is satisfactory for use in production welding. Electrodes are tested by lot and code number and must be approved

X-ray inspection is used to check typical welded assemblies which are picked at random from production lines.



Weld probing instrument cuts small areas from welds for closer inspection. Small holes left can be easily rewelded.

for production use by the Metallurgical Division before they are released.

Control Production Welding

Problems encountered in the shop from time to time become the concern of the various divisions.

For example, if an operator has trouble with cracked welds, the line inspector informs the production supervisor. Welding technicians of the Metallurgical and Inspection Divisions and the trouble shooter from Planning Division are called to determine the trouble and takes steps necessary to eliminate it.

The Inspection Division determines that welds are of desired size, penetration and soundness, and that the assembly has correct dimensions.

If it is a design problem, Engineering Division is consulted.

If materials are suspected, they are analyzed by the Metallurgical Laboratory to determine their suitability.

The job of routing work to specific shop locations, to see that proper machines are in location and the writing of welding instructions sheets are functions of the Planning Division. Instruction sheets are never issued until welding conditions have been thoroughly investigated and approved by an authorized member of Planning, Inspection and Metallurgical supervision.

Inspection Methods

Welded assemblies are constantly under the watchful eye of the Inspection Department.

Inspection methods used are destructive and non-destructive.

Typical welded assemblies are submitted daily to the Metallurgical

(Please Turn Page)

Division for X-ray examination. These assemblies are picked at random from production and are thoroughly checked for quality of their welds. In the event the welds in a certain assembly are defective, all similar assemblies produced are thoroughly checked for quality of their welds. In the event the welds in a certain assembly are defective, all similar assemblies produced are checked until trouble is eliminated.

Line inspectors use weld gages to determine if welds are of specified size. This is in addition to close visual inspection.

Magnetic particle inspection is another non-destructive testing method used at Caterpillar plants.

When it is necessary to use a destructive method of inspection to determine underbead hardness, micro-structure and other properties, welded assemblies are submitted to Metallurgical Laboratory for complete examination. Such assemblies are sectioned and test

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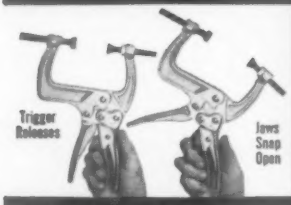
ANOTHER DE-STA-CO FIRST...
3 New Portable Clamps with
TRIGGER-RELEASE



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Instant easy action enables operator to clamp and release the tool with one hand . . . Clamping Pressures up to 1200 lbs. . . . Especially Rugged Construction for extremely long wear!

Two Other Models...

MODEL 482

MODEL 486

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World's FIRST Line of TOGGLE CLAMPS
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—Allows Full View of Work

Part	Size	Listed Price	
C-6	6/4¾	$4.90	FLARING CUP
C-5A	5/4	4.80	
C-5B	5/3¾	4.80	
C-4	4/3	4.70	
CS-6	6	4.90	STRAIGHT CUP
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Adaptor for straight bushed wheel — list price $4.75

SEE YOUR GRINDING WHEEL SUPPLIER

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16816 Waterloo Road • Cleveland 10, Ohio
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specimens machined from them. These specimens are used in tensile, Izod impact and bend tests,

Routine testing of welding electrodes determines if a shipment is satisfactory for production welding. Similar tests are made on new electrode-types or those obtained from a new source.

micro and macro sections and for chemistry samples.

Destructive testing is employed when welding problems arise in the shop or when setting up welding instruction sheets.

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produces tough, ductile
MANGANESE-NICKEL
STEEL
WELD DEPOSITS
FASTER
and
EASIER
WITHOUT PEENING,
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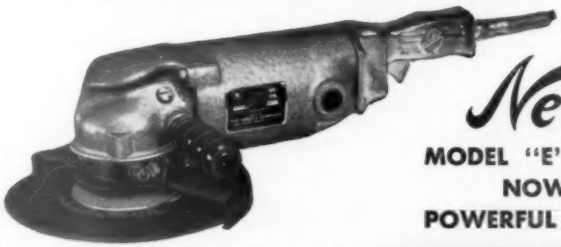

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MODEL "E" SANDBRUTE
NOW WITH
POWERFUL 2HP MOTOR

Write today for new 4-page bulletin that describes complete line of Nedco grinders, sanders and polishers. Operating specifications and price data are given.

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NEWS

from page 46

Welding Pioneer Dies

Hugh F. Brown, Sr., president of Brown Brothers Welding Co. and president of National Welding Equipment Co., both of San Francisco, passed away in his 71st year on February 3, 1956.

Being dissatisfied with early makes of gas welding and flame cutting apparatus then on the market, Brown Bros., Mr. Brown and his brother, Will, began to produce equipment for their own use. During the early 20's they manufactured this equipment for resale and thus created National Welding Equipment Company.

WOOD HANDLE OR STEEL HANDLE—

Atlas Gives You The Best!

For welders who prefer wood handle Tomahawks, Atlas W-H models are tops. "Tough" *induction hardened* heads, long, thin chipping blades assure maximum life.

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for a firm grip . . . *demand Allied* **BULLDOG**

TRACTOR GROUSER RETREAD

- EXCLUSIVE DESIGN
- INCREASED TRACTION
- RE-LUG WITHOUT DISMANTLING
- WORK-HARDENING STEEL
- SCIENTIFICALLY "WELD-METALIZED"
- ANY SIZE OR SHAPE

Also . . . Steel Plate, Grader Blades, Special Cutting Edges, Pneumatic Tools, Traffic Signs and Sign Posts, Gutter Broom Wire and Fibre Brooms.

Territory open for agents and dealers.

ALLIED STEEL & TRACTOR PRODUCTS INC.

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TIG WELDING

Made Easy With

"Visuweld" Torches

VISUWELD torches improve and simplify tig welding by giving faster and better welds with less effort and minimum torch maintenance.

- The lightest and smallest 300 amp TIG welding torch with super maneuverability.
- Only TIG torch made with standard size transparent cup that guarantees absolute welding visibility.
- No SPARE PARTS NECESSARY. No gaskets or parts to 'screw together'.
- VISUWELD contained unit torch head guarantees no water or gas leakage, and the coolest TIG welding torch ever designed.

Perfect welds at welding ranges from 3 to 300 Amps eliminates the need for 'standby' torches. VISUWELD torch are 3 torches in 1.

See us at Booth 112

AWS WELDING SHOW

MEMORIAL AUDITORIUM

Buffalo, N. Y., May 9-11, '56

TEC TORCH CO., Inc.

300 Paterson Avenue

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Norris Thermador Honored by Chamber of Commerce

In recognition of its "outstanding contribution to the betterment and general welfare of the Los Angeles area," the Los Angeles Chamber of Commerce recently presented a 25th Anniversary Award of Merit to Norris-Thermador Corporation.

In ceremonies attended by the Chamber's board of directors, Chamber president Carl P. Miller said that his organization takes "pride in the growth and progress which this nationally prominent company of local origin has experienced."

In the above photograph, the

Industry's Fastest Selling

CYLINDER TRUCKS

LT-200

Many Styles For all Sizes of Cylinders

Write for full Information

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JOHNSON WELDING EQUIPMENT CO., INC.
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INDUSTRIAL AIR PRODUCTS CO.
3200 Northwest Yeon Ave.
Portland 10, Oregon
(branches in all principal cities in the Northwest and the Gulf-South)

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Commemorative plaque is shown being presented to Kenneth T. Norris, **left,** president, and William E. Cranston, first vice president, of Norris-Thermador, by Carl P. Miller, **right,** president of Los Angeles Chamber of Commerce.

Airco Plans 16 Million Dollar Expansion in 1956

A 16 million dollar expansion program for 1956 to meet the rapidly increasing demand for its industrial gases is under way by Air Reduction Sales Company, a division of Air Reduction Company, Inc. This expansion is said to reflect the confidence Air Reduction has in the anticipated increased use of industrial gases.

Three new producing plants are scheduled for completion this year; at Chicago, Ill.; Alton, Ill.; and Calvert City, Ky. Additional facilities will also be installed at Butler, Pa., and Riverton, N. J. A portion of the appropriation will also go towards expansion of gas-producing facilities in the southwest.

Included as well in this program are additional distribution facilities throughout the country.

GLENN COMPANY — CONSTANT VOLTAGE *News Notes*

Is Your Automatic Welding Power Source Outdated?

It is, if you're using variable arc voltage with variable wire feed—and getting variable results!

GLENN Constant Voltage Welders operate at fixed arc voltage, which means fixed wire feed rate for consistently top-quality welding. Results? Better welding, with fewer rejects, at far lower cost!

GLENN CV welders are job-proved for submerged arc, inert gas, CO-2, "squirt" and automatic hard facing and stud welding processes. 4 models—300, 500, 750 and 1200 amp. continuous duty rating, 18-42 v. arc voltage range. Write or wire for literature, application data, prices.

6

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CONSTANT VOLTAGE PIONEERS
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Quality in any quantity.

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Western Welding Show

The first Santa Clara Valley Welding Show and Clinic will be held in San Jose, California, on Friday and Saturday, April 27 and 28, 1956.

The event will be held in the Engineering auditorium of San Jose State College. The show is being co-sponsored by the Santa Clara Valley Section of the American Welding Society and the Engineering Department of San Jose State College.

The show will be unique in its setting. The live exhibits will be placed among the most modern metallurgical and mechanical engineering equipment used at the college in training engineers. Weld and metallurgical test equipment will be in operation. Exhibitors will show the latest in welding equipment, and many new processes will be demonstrated. As well, welding and industrial type films will be shown throughout the show in a comfortable soundproof theatre.

Many national manufacturers have already taken space, and all of the local welding suppliers are said to be exhibiting.

Wearalloy
Wearalloy "A"
A low cost — high abrasion resisting — carbon manganese steel.
PUNCHING AND SHEARING—due to high hardness, must be done with care.
FORMING — readily hot formed, but cold forming not recommended.
WELDING — use low-hydrogen electrodes.
APPLICATIONS — wear plates for drag buckets, conveyors, liners, chutes, hoppers.
To Resist Abrasion and Wear at Low Cost
Wearalloy "B"
A shock and wear resisting steel — for use where shock and abrasion is primary cause of failure.
HARDNESS — 350-400 Brinell.
FORMING — can be cold formed.
WELDING — use low hydrogen electrodes.
APPLICATIONS — ore chutes, quarry dump truck, bottom liner plates, rock crusher liners, wear liners, concrete block machines, concrete pipe core liners.
Write for interesting application and procedure data on both types.
FORD STEEL CO.
5051 PATTISON AVENUE
ST. LOUIS 10, MISSOURI

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Circle No. 2 on Reader Service Card.

WELDING CLINIC

(Continued from Page 128)

machinery welded from aluminum components.

Paul Dickerson, welding engineer from Alcoa's Welding Laboratory, conducted demonstrations of aluminum welding.

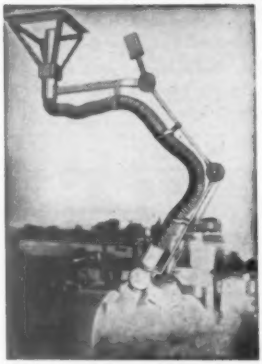
Other exhibitors, equally effective, included General Electric Company, under supervision of Robert D. Mann, who conducted the clinic in carbon dioxide welding of mild steel; Linde Air Products Company, directed by John S. McKenzie, who demonstrated inert-arc welding of stainless steel using automatic equipment; and Miller Electric Manufacturing Company, which provided much of the welding equipment used at the clinic.

A reference library of American Welding Society books were given away as a door prize.

Much of the credit for the success of the venture goes to R. A. Webster, chairman of the Washington section, who with his committee and personnel of the Southern Oxygen Company, planned this meeting and made all of the arrangements.

Weld-O-Vent

WELDING FUME EXHAUSTERS
MANY EXCLUSIVE FEATURES
by
ENGWALD CORP.
"The World's Finest Exhaust Systems"



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- Portable and stationary units for all applications.
- Unlimited flexibility, fast, easy positioning, over 360° radius.
- Blowers can be attached to units or mounted at remote points connecting with ductwork.
- Units can be connected in series.

Available in 9, 12, or 16 feet reach units.

Write For New Application Data . . .

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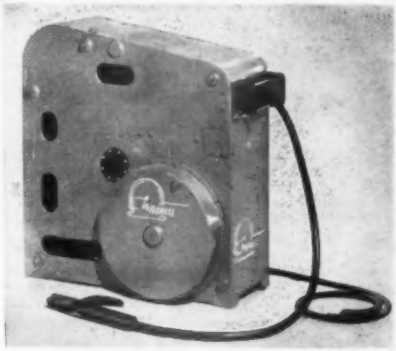

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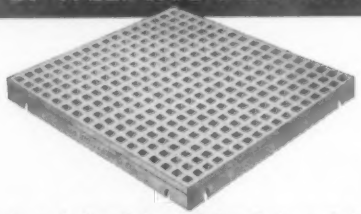

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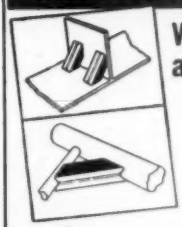

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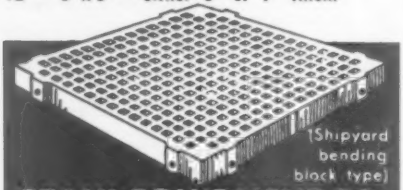

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